

THE WINSTON CHURCHILL MEMORIAL TRUST OF AUSTRALIA

CHURCHILL FELLOWSHIP 2002/2

Report by Peter Dimitris Dalagiorgos

To Undertake a study of Manufacturing Methods
and Techniques
Used in Lute making, particularly Bowl Making.

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Signed: Peter Dimitris Dalagiorgos Dated 13 January 2004.

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Summary and Acknowledgements

This report details the findings from a 2003 Churchill visit to USA, Greece and Turkey studying the manufacturing methods and techniques used by both traditional and industrial musical instrument makers.

I wish to acknowledge the kind help and support and assistance given to me by the following without which my fellowship would not have been possible.

- The Winston Churchill Memorial; Trust, for their moral and financial assistance;
- The enthusiasm and encouragement from fellow members of MIMOSA, (Musical Instrument Makers of South Australia);
- My referees, Mr. Keith Preston, Mr. Jim Redgate, Dr. Gouri Yogalingam, who provided me with excellent references who understood my aims, goals and ambitions;
- My family members Arthur and Christina Dalagiorgos, Con Dalagiorgos, my Daughter Christina Dalagiorgos and friends Michael Guifreda and Guissepi Tripodi for their love and support and assistance throughout the course of my fellowship.

Executive Summary

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Project Description

To undertake a study of manufacturing techniques used by both traditional and industrial musical instrument makers of the bouzouki and oud (lute family) in USA, Greece and Turkey.

The project involved examining and comparing traditional and high tech manufacturing methods acquiring these skills and developing them to be used and shared by Australian Instrument Makers.

Fellowship Highlights

1. Memphis USA: Visited the Gibson Guitar Factory. Viewed large scale manufacturing plant of one of the worlds leading instrument makers.
2. Nashville USA: Visited the Gibson mandolin Plant. Viewed large-scale production techniques of the mandolin.
3. Athens, Greece: Visited Sakis Bouzouki manufacturing Plant. Viewed large-scale production in Bouzouki making.
4. Athens, Greece: Visited Antonis Anastiadis, specialist bouzouki bowl maker.
5. Athens, Greece: Visited "Fotis" Bouzouki Bowl manufacturing plant.
6. Aydin Turkey: Visited Oud maker "Haluk Aydin."

Findings

1. The craft of bowl making is a highly skilled technique mainly carried out by skilled craftsmen specialising in only bowl making;
2. Bowl making is a hands on technique that requires a lot of practice to perfect;
3. Backs of other instruments, e.g. mandolin, are produced with high tech machinery which can be implemented to the production of bouzouki bowls;
4. I discovered that certain techniques used by old craftsmen are still kept secretive.

Programme

Memphis USA - 28.07.2003 to 03.08.2003

- Gibson Guitar Factory;
- Attended Tour of Sun Studios;
- Tour Graceland;
- Martin Luther King Memorial Museum.

Nashville USA – 04.08.2003 to 06.08.2003

- Gibson Guitar/Mandolin Plant;
- Parthenon Museum;

New York – 08.08.2003 to 10.08.2003

- Dio Dino Instrument Premises;
- Twin Tower Site;
- Statue of Liberty Museum.

Wroclaw Poland – 10.08.2003 to 22.08.2003

- Krzysztof Mroz Master Lute Maker
- Visited family.

Athens Greece – 23.08.2003 to 10.10.2003

- Matsikas Bouzouki Plant;
- Antonis Aristidis Specialist Bowl Maker;
- Fotis Bowl Maker;
- Takis Vergetis, Master Bouzouki Maker;
- Zozef, Master Bouzouki Maker;
- Tsakirian, master bouzouki Maker;
- Panagiotis Varlas, Master bouzouki Maker;
- Acropolis and Museum;

Izmir Turkey – 10.10.2003 to 15.10.2003

- "Ipek" Luthier, Saz Maker;
- Kenan Zarei, Oud Maker.

Aydin Turkey – 15.10.2003 to 20.10.2003

- "Haluk Aydin" Master Lute Maker.

Hios Greece – 20.10.2003 to 28.10.2003

- historic sites
- Holidays.

Athens Greece – 28.08.2003 to 02.11.2003

- Ross Daly, World-renowned musician and recording artist.

Main Body

In Australia musical instrument making like many other crafts or arts has a relatively short history. Many craft people struggle to find piers or expert masters to help them along their formative years. A journey like this one I have undertaken opens up a wealth of history and information to isolated makers crafts people like myself in Australia.

This Fellowship provides an opportunity to discover the “real thing” with past generations and information that has been handed down and inspires and stimulates ideas.

My Fellowship led me on a voyage of discovery in two continents, firstly I traveled across USA, which in the past twenty years has experienced resurgence in instrument making and has devised many new high tech techniques for the craft to prosper.

Secondly I traveled across to Europe, a place full of tradition and secret of a trade that has been part of the culture for hundreds and thousands of years. My research found a variety of different techniques used in instrument making (there is no one right way to do things). I found that each maker and in fact even large factories do things differently. At Gibson in Memphis USA I found numerically controlled contour cutting machines providing thousands of exact copies in parts and full body guitars. Gibson Mandolin Plant in Nashville however use a methodology that requires several highly skilled craftsmen all producing different sections of Mandolins in a type of human skilled production line, creating a high quality mass produced hand made product.

Europe was the jewel in the crown for my research. I sat closely besides traditional instrument makers and watched them work their magic.

WHAT I FOUND

The Mould:

The construction of the lute depends on the accuracy in which each rib can be shaped and bent so as to fit together snugly to each other rib and to the mould. The ribs are assembled over a solid wood mould. Each sized bowl has its own special sized mould. The mould is shaped out of solid wood, usually laminated together to make a solid block and then shaped with the use of planes to make it the exact shape of the inside of each and every differently sized bowl. The mould also houses the two end blocks. The end blocks are two pieces of wood which are inserted and located at each end of the mould. The end blocks should be made of a stable fine-grained wood. Many makers use spruce or a wood of similar characteristics. The end blocks are glued in place with a separator, generally being a heavy weight paper to allow the finished bowl to be pried away

from the mould. Once glued in they need to be carved and shaped to follow the contour of the existing mould. The purposes of these end blocks are:

1. To provide a gluing surface for the ribs to be secured;
2. To house the joint of the neck to the bowl. Front block only;
3. Provide support and strength to the secured ribs.

The Ribs:

The maker starts by selecting the wood for the ribs. The ribs must be of a hard wood; usually maple, walnut, beech or rose wood is used. The wood must be seasoned or dried for at least 4-5 years. The ribs are sliced off a solid block of wood by band-sawing them into slices 4-5mm thick. They are then thickened to approximately 3mm thick. A template is then placed over the sliced wood and the outline of the rib is drawn over a selected area usually avoiding any knots or twisty grain as these flaws may weaken the structure. The ribs are then cut to shape of the template allowing a 2mm overhang all round. Each rib now resembles a leaf or surfboard shape pointed at each end, long and slender.

Once all the ribs are cut to shape they should be arranged into the positions they will take in the bowl. This is done by laying the ribs down on the bench and selecting the order in which they should be assembled. Usually a certain pattern will suggest itself. The ribs are then marked with the centre rib being "0" and the following ribs being -1, -2, -3, -4, and so on to the left of the centre rib and +1, +2, +3, +4 and so on to the right of the centre rib.

After the ribs are cut to shape they must be bent to the contour of the mould. Each rib has its own specific place on the mould. The bending is done by placing the rib over a hot copper pipe of approximately 4 inches in diameter. Holding the rib in each hand pressure is applied either side until the rib begins to bend. We begin where the bend is the greatest, which will be somewhere about a third of the length from the bottom point. The bending must be done quickly as too much heat will dry out the wood and prevent it from bending. The rib may be dampened on each side with a wet rag, which will help the wood "give" and bend into its new shape.

I also discovered that the bending process in larger plants is done differently. They bend 15 ribs at a time, all the ribs are placed into a specially built bending jig which is shaped to the ribs contour resembling a long drum with electric elements being used to heat the drum from the inside. The ribs are placed in position then a wide piece of aluminum sheet is pulled down over the ribs in one steady action. It is then locked into place with the ribs sandwiched between the drum and the aluminum sheet. The heat is then turned off and the ribs are left in place for an hour to cool and set into their new shape.

Trimming - "Edge Shaping"

Once all ribs are bent to shape their "edge" must be trimmed. Since the ribs are at an angle to each other their edges must not be perpendicular to their surface, but must be beveled to ensure a close fit. Because the rib is bent to a curve, this bevel is not constant but must vary throughout its length. This can be achieved by three methods.

Method 1.

Each rib must then be "edge shaped", that is the glued edge must be trimmed to the exact angle to match the next rib. This is done by drawing the edge of the rib on its side along a sharp plane held upside down in a vise. The shape of the edge of the rib magically determines the edge profile by this simple procedure. Each rib is shaped and trimmed this way.

Method 2.

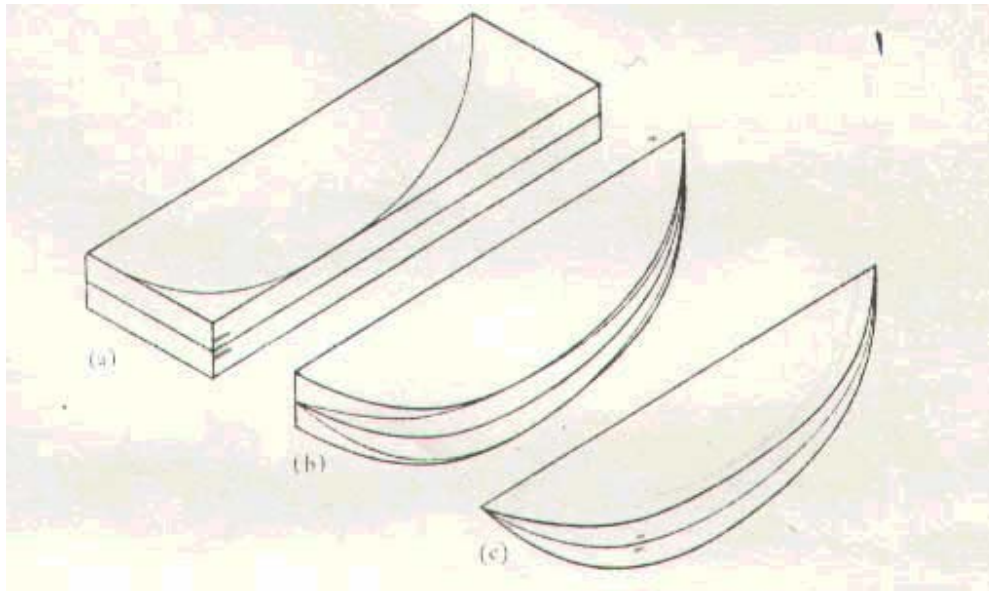
By placing the rib over a forma of the correct wedge shape, against which the edges are trimmed. The forma may be made by several methods. The first way is to take a piece of wood and shape it into a wedge to the exact shape of each rib. With this forma the ribs are attached to the face with the use of double-sided tape. The overhang is then planed off with a small block plane set very finely. This is done on both sides of the rib. The rib is then removed from the forma by inserting a thin blade between the forma and the rib.

Method 3.

The edge of the ribs can also be trimmed with the use of a router table. This is mainly used in mass production plants. The bent rib is clamped onto a rib forma specially designed to run across a router table. The edge of the rib is cut by a set router bit. Once one edge is cut the clamps are removed and replaced one by one on the alternate side of the rib forma allowing the other side of the rib to pass along the router cutter for edge trimming.

Diagram B.

Construction of Forma for method 2.



Assembly

As mentioned earlier, we start building the bowl by working from the middle out. The centre rib or first rib is marked "0". Subsequent ribs on either side are marked (+1), (+2), (+3), etc and the (-1), (-2), (-3) and so on. Usually 15 to 17 ribs will make up a medium sized bowl. Assembly starts by placing the centre rib "0" carefully on the centre line. Place the rib exactly in position by applying glue to each end block. Subsequent ribs edge are glued to each other. They are held together with good old masking tape and pins placed along side the ribs driven in the mould. Correct positioning of the centre rib is essential, as any errors will accumulate as the rest of the body is built up.

Once the first rib is in place, rib (+1) can be glued followed by rib (-1), then rib (+2) and so on until all ribs are glued in place. The bowl is then left to dry over night. It can be removed from the mould the next day and can be supported with strips of parchment or linen cloth glued in along the joint on the inside of the bowl. Once this has been done the bowl will lock in place and form a strong bond. The bowl is finished off by adding a capping strip, which is a strip of wood 2.5mm thick, glued in around the back edge of the bowl providing further support for all the ends of the ribs.

Finally the bowl must have its top edge leveled. This is quite simply done by firstly planeing any high spots down and then placing the top edge or face of the bowl down on a large flat sanding board and running the bowl back and forth

along the sanding board until it is perfectly flat. The bowl is now complete and ready to be taken on to the next stage of the Lutes construction.

Conclusion

In conclusion I am able to say that I have acquired the necessary skills to enable me to successfully build bowls of a high standard. I have found the process of bowl making to be a very exacting and that extreme care must be taken in all the stages, as any minor faults compound into discrepancies which alter the shape and structure of the finished bowl. I have also found that part of the process can be mechanized which can speed up the process. The use of routers to cut the edge angle of each rib provides a more accurate process for makers who only build small quantities, compared to full time bowl makers whose skills are up on par with their output. Also the use of specially designed bending gigs that can accommodate the bending of 15 ribs at a time, instead of one at a time greatly speed up the process and do provide more accuracy.

Recommendation

I propose to pass on my newly found skills and knowledge to my fellow instrument makers via regular meetings of MIMOSA providing the information on my website, festival exhibits, seminars and workshops for local schools, community organisations and philanthropic organisations.

I also believe there should be an accredited course on Musical instrument making here in Australia, probably being administered by government bodies such as TAFE etc. to provide information and skills required for future Australian instrument makers. The course should draw on skills and knowledge already acquired by existing established Australian Makers.