

How to make a Maloof inspired rocking-chair

Richard Zimmermann



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To make a rocking chair is to build an object that will probably stay in your home. It's an object related to the one who did it, because it is difficult to do and has a very original charm.

He can become a companion everyday, a place of relaxation, reading and conversation.

By its elegance it also participates in the style of your home..

This seat is accessible to a good woodworker amateur with this very precise manual, because nothing is obvious in its manufacture. The realization of this seat requires 200 hours of work and requires a lot of method, but I do it in my garage.

I deliver here all the tips and peculiarities that I discovered, little by little over three years, after having visited the Sam Maloof Foundation workshop in Los Angeles in 2013.

I went through all the literature in English, as well as the many videos dedicated to this seat especially by Sam Maloof. So I think I have found the right definition of procedures and good manufacturing guides needed, because they contribute to the balance of the seat.

In this seat there is no right angle, and there is some sculpture .., which is outside of the ordinary practices of the orthogonal furniture ... There are at the same time very precise fixtures for the solidity, equilibrium of the seat, and on the other hand approximate assemblages, where symmetry is a constant concern. The sculpture of wood, finally uncomplicated, comes down to harmonious and balanced junctions, each will be done according to his taste.

Its comfort in particular is related to its geometry and its balance. It 's totally modeled on the anatomy of the man, and we will see at the time of adjustment that his balance depends on the center of gravity of the structure.

I am a retired orthopedic surgeon and basically this seat is very physiological on a medical point of view.

This seat has seen many aesthetic evolutions, and it is widely copied in the US under the name of « Maloof inspired rocker ».

According to the different authors I have read, the production is different.

Some assemble and glue raw structures early, and then sculpt. It's always possible. In this manual the final building and gluing is quite late.

The sculptures are done little by little, for security, in order to be able to take back a piece in case of error, and do nothing unrecoverable.

From one source of wood to another, from one operator to another, there will never be two identical rockers, because each has an aesthetic sense.

In this manual with over 400 pictures, I give a reasoned and chronological description of the realization of the seat according to my experience. It must be understood that there is no right angle here, and that it must be cunning, to get to keep the symmetry and balance.

You will also find the secret of the good proportions, which asked me a lot of research. The balance of the seat is done by the comprehension of its geometry. The seat can be completely missed if after gluing, you realize that it tilts too much forward, or backwards, or worse that he does not like to tip.

Indeed, when the collage of the rockers on the seat is dry, before finishing and the final sanding, comes the critical moment in the workshop. This is the moment when you get in for the first time.

Because the reception of this seat without cushion, is very particular. It's really very comfortable from the beginning, it's positioned naturally to its occupant, it invites relaxation.

It 's therefore a nice reward following this beautiful trace that Sam Maloof has left behind him.



Sam Maloof
1916-2009.

Picture from internet
public site.

1) Aesthetic of a rocker :

The overall shape of the rocker corresponds to the human anatomy.

The position of the armrests, the angle with the seat, the height of the backrest, and especially its shape reflects the anatomy of the back and the proportions of the human body. The height of the seat from the ground is about 42 cm, and its inclination reflects the position of its center of gravity on its fulcrum.

The overall aesthetics and proportions can vary on details that will be described.



There is no reinforcement bar between the feet and posts, because the structure finds his lightness in the 4 mortises which unite them to the seat. Maloof who developed it, evokes a double mortise ("double slotted mortise"). I will describe its manufacture using its terms, the tail on the side of the feet and the mortise on the side of the seat. This assembly is of a terrific strength, and it allows an aesthetic eccentricity especially for the front leg, widely deported outside thanks to the sculpture. On the rear post, where this double-mortise assumes a large contact area, 90% of the entire weight is support without problem.



The rear posts are bending 4 to 5 ° outside, and armrests are placed forward systematically.

The horns that are added to the rear posts are sometimes absent, the armrests can be located on the side of the rear post, which is easier and more aesthetic. For my part I worked on woven seats like French « Provençal » chairs, with a good esthetically result.

In fact it' s the sculpture and the essence of wood that will give the most different aspects.

A rocking chair is 1.25 to 1.30 m long, 65 cm wide and 1.10 m high. It weighs on average 17 kg. Cutting and carving of this seat will remove 80% of the wood invested, so it is.

The reference wood is California claro walnut, which is a very figurative wood and pleasant to shape, and especially that takes with time a typical patina. It is therefore a piece of furniture that becomes more and more beautiful with time and use.



Sam Maloof's original models, left 60's, right 90's. Seat, armrest, headrest vary. Pictures from internet public site.

Compared to the first style of Sam Maloof, I describe in this manual the realization of the final model of the aesthetic evolution of Sam Maloof, the seat is concave, the rear post are less spread, the slats more anatomical, the front foot and the armrest more elaborate .. Also everyone can give his style, simplify or vary a point, not to mention the variations related to the choice of the essence of wood.



The typical seat is made of a block of 5 pieces, assembled slightly concave then shaped with grinder. This procedure is quite unusual in wood working.

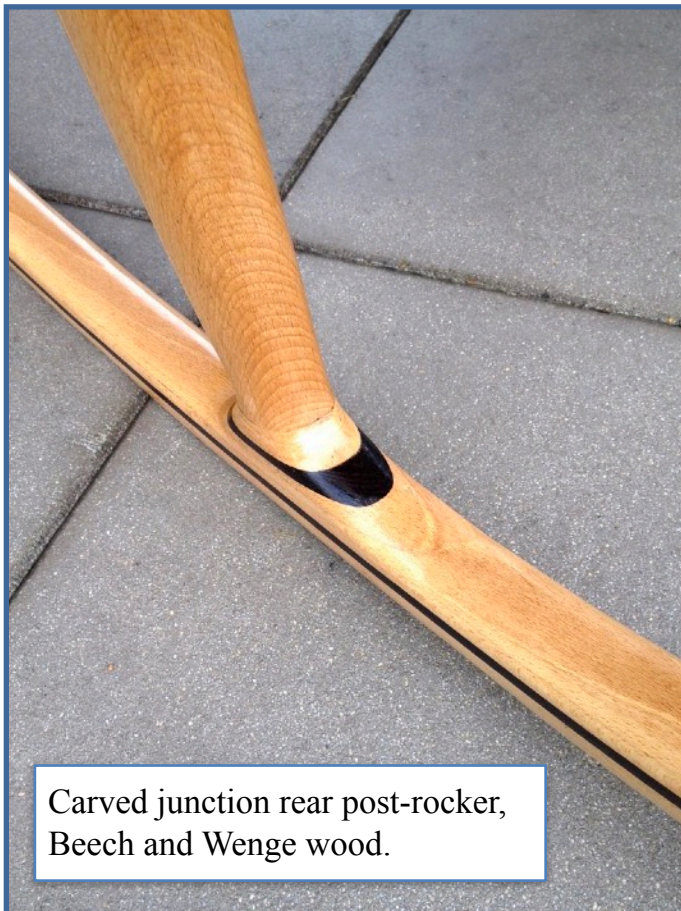
Seat is carved according to a hull in front, and a hollow behind. It's four corners include the so called "double slotted mortise" by Maloof.



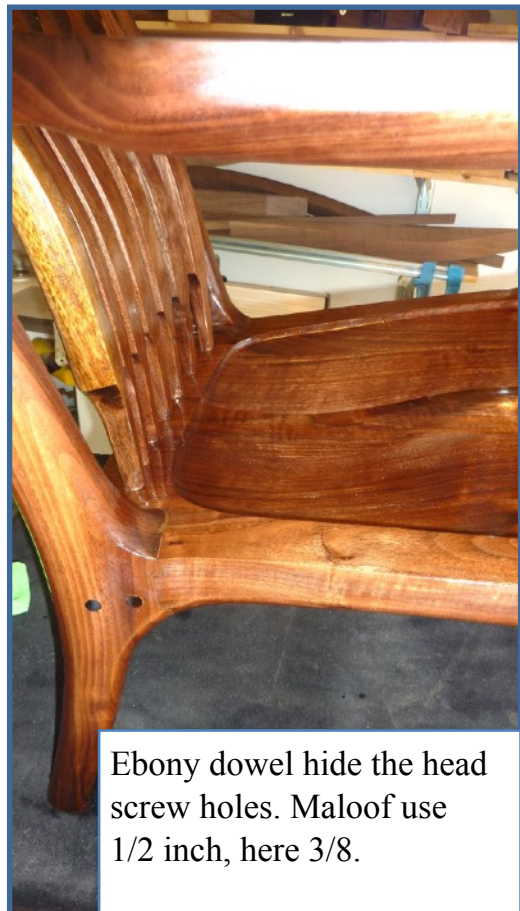
Wood fibers are used with the sculpture to enhance appearance .

Front leg is turned and very carved with a tangential connection to the seat, very aesthetic. This principle of soft junction is found on the rear post, in its assemblies, with the headrest and armrests, but also at the front leg connected tangentially to the underside of the armrest and the rocker.

In the version presented here, compared to the original style, the front foot is discreetly tilted, giving for my sense, a little less stiffness. I do it with a slightly eccentric turning .The height of the armrest relative to the seat is also a little lower.



Carved junction rear post-rocker, Beech and Wenge wood.



Ebony dowel hide the head screw holes. Maloof use 1/2 inch, here 3/8.

At the level of the rocker at the bottom junction of the foot and post, there are 4 slices of wood, to give more shaped roundness, incorporating a slice of contrasting wood similar to the rest of the rocker : ash (clear) for walnut, wenge (black) for oak, or other clear wood such as beech.

All the junctions between the feet and the seat, the armrests, the rocker and the headrest are subject of a smooth transition on which the hand slide naturally. The rear part of the headrest presents a gutter, going up in the horns at the top. Sam Maloof extended it to the inside of armrest, very difficult to achieve (unable).



The headrest has a very particular upper concavity, with clear upper edge, and an increase of thickness downwards shaping a Tear-drop, quite original, giving the upper edge a certain finesse, and at the lower edge a thickness to accommodate the dorsal slats.

The length of the rocker is impressive 1.25 m to 1.30 m, it is the originality of this seat. The useless is sometimes necessary.. But its posterior overtaking is not so important when the seat is over, and finds its equilibrium. It is about 40 cm apart from the overall size of the seat.

When the rocker is short, to save space, it loses some of its charm. Each rocker is made of laminated strips of 7 strips of 40 mm wide carved, will end around 37 mm. The dorsal slats, very anatomical are in principle carved, but it is easier to make them also laminated with 2 or 3 strips.

2) Preliminary to the making of a rocking chair

1) The choice of wood:

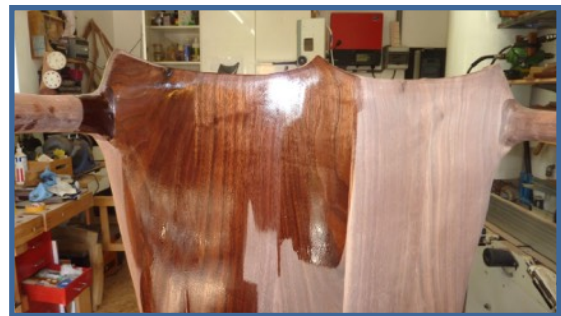
The most practical is to start from planks that have been directly sold by a recognized supplier.

The alternative is to start from sawn timber trays, which allow you to choose fibers and a rarer or more aesthetic wood, but with a lot of preparation, edging and planing work.

The reference wood is walnut. Gentle and pleasant to work, its particular smell invades the workshop.



Walnut board made from Croatia



A little bit of 90 ° alcohol passed with a rag gives the future appearance of fibers and wood grain. It evaporates in a few seconds.



Some ebony for plug, inserted as dowel on screw heads.



French Perigord Walnut very figurative, also used for the manufacture of hunting rifle butts.

The walnut sapwood is a difficulty. It can be very clear and unsightly, so it's better to eliminate it, which implies great loss of wood. Sometimes the sapwood is darker with harmonious fibers, and well coordinated to the heart. In this case, as Maloof said, it's useful to associate the sapwood in the seat, in two adjoining piece, to make a good continuity. We must therefore use wood from the same tree, and not cross the origins.

Walnut is very toxic and it is necessary to wear a filter mask at all dusty stages including sanding. It is always better to machine in suction and with the atmosphere filter workshop ceiling in action.

For my part I use disposable surgical filtration masks, that can be found in pharmacies. These masks are very comfortable and protect very well from wood dust, if they are discarded and not reused. They can filter bacteria up to 90 micron size, far most fine than wood dust. They are very economical in addition.

It is better to work outdoors in the open air, during digging and sanding times with grinder, which produce considerable amounts of chips and dust. In particular for the making of the seat. This will avoid seeing his workshop submerged by chips.



OAK :

Oak wood has a strong tendency to retract. It requires perfectly dry planks, coming from rather old and voluminous trees. The most peripheral and dense fibers are the best from the second and third log plank. Oak is easily tinted.



Beech is a a good alternative, much cheaper, easy to work, they are fairly consistent in quality. They are also quite easy to find at lumber merchants and sawmills, planed planks ready to work. Beech is not easy to tint.



Birch and cherry are a good alternative, much cheaper than walnut. It is easier to work than oak, and supposed easy to tint. They give easy beautiful finish.

Overall I give up to tint a so complex structural seat. Long work can be compromised by a daring attempt of tint.



The walnut ready to be machined is a good starting point.

Here walnut from French Dauphiné straight from sawmill.

The sapwood is chalk-insulated on both sides.

This will suffice just for a rocker ..

I try to locate boards from very old trees, whose cut is orthogonal to wood fiber, as dense as possible.

Vendors are accustomed to deduct from the price the nozzles and cracks, but not the sapwood.

However one can, in fact, use a beautiful ripple line to place it on the seat, or use the general fiber of the wood to reproduce it on the shape of the rear post.



Cherry wood used for rear post. Wood fiber are perfect for this job

2) Supply, storage and cutting:

For a flat supply from a lumber merchant, the ideal is to obtain planks **24 cm wide**, perfectly flat, without major deformations, especially warp or bending.

The ideal thickness is **54 mm** as a the standard (2 inches). **64 mm** allows more volume to give the thickness of elegant tear drop headrest and curved armrests. You can mix different plank thickness. A Stanley Model 12-960 Bailey Low-Angle Block Plane will help to choose good fiber, with merchant permission. Depending on the available dimensions, draw the dimensions of the different templates on the plank, and make a preliminary choice with chalk line. This gives an average of two boards of 3 m, or 3 of 2.2M by 24 cm wide.

- DIMENSIONS TO BE DRAW ON THE BOARDS :
- One of 130 cm X 18 cm. For rocker slats -
- One of 104 cm X 6 cm or two of 52 cm X 13 cm. For the 2 front legs.
- Two of 20 cm X 130 cm, or one of 135X24 cm for the two rear posts.
- Two 55 cm X 14 cm for 2 outer parts of the seat.
- Five of 55 cm X 13 cm are: **2 armrests** and 3 central parts of seat.
- **One of 55 cm X 19 cm for the headrest.**
- One of 80 cm X 24 cm for 7 slats carved, or glued laminated.
- **(66 mm thickness for armrest and headrest eventually)**

On average it takes for a rocker 1.32 m² of surface with 54 mm thickness, so its a 0.680 M³ volume.

The ideal thickness is at least 54 mm or 2 inches for a flat classic rocker, but the thickness of 64 mm seems more useful, it give some volume to the foot sculpture, the seat, and the headrest especially for a rocker with a concave seat, more elaborate. It is always possible to add a layer of 1 to 1.5 cm to give volume to the sculpture, for example on the mortise of the front legs and rear posts, or facing the implantation of the headrest.

Here a first job on a sawmill rough walnut board with 8% hygrometry:

After a stay of a few weeks in the workshop, the board is prepared with an electric plane set at 1mm. This makes it possible to assess the fibers on both sides, but also to see the cracks and potential defects. The importance and quality of the sapwood are appreciated. Chairs with curves and angles like this are best made using a full size drawing, which makes it easy to create accurate templates. **These templates must be done previously, they help to choose the best cut in your board, precisely locate mortises, and also will be used to guide the router bit in somme very difficult shape. Guide for full size drawing are deliver further,**

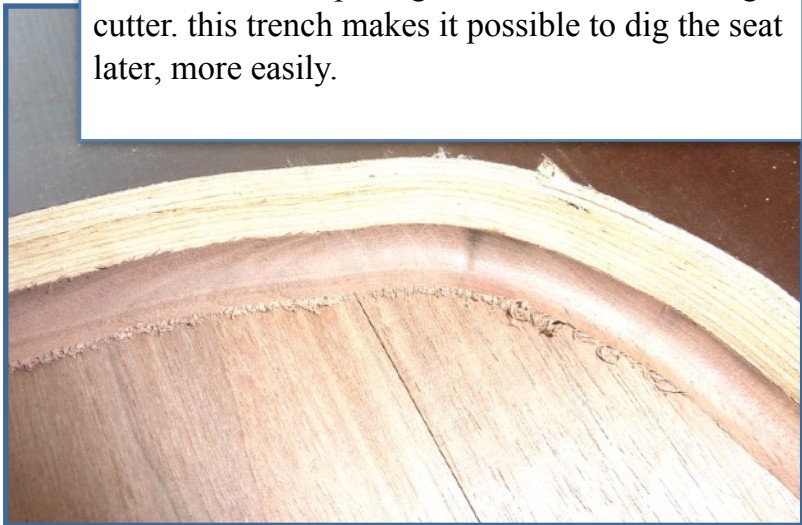


Rough shaping give a good idea of fiber, sapwood and useful curve.





Here the seat template guides the 10 mm rolling cutter. this trench makes it possible to dig the seat later, more easily.



The "Arbortech" disk does not cut on its edge. He can lean on the edge of the trench at the beginning, then descend slowly.

This trick facilitates the sculpture of the concave hollow of the seat. The result is easy to acquire. It's resolve an important difficulty of this seat.



3) About the different templates and shaping guides :

It takes several template and guides which must be done previously.

They contain the ideal proportions of the seat. You must first draw them freehand, on a large sheet of 5X5 cm squared paper.

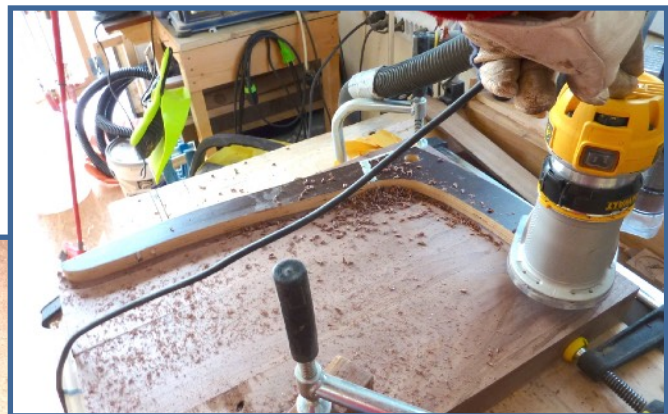
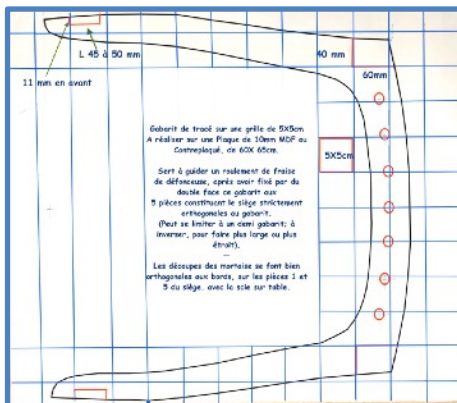
This sheet will be glued on MDF or 10mm plywood, and cut with band saw, and fine tuned. There is no template for the front foot.

Here these template draw on a 5 cm grid are perfect for people between 1,70 and 1,85 m. With a smaller grid for example 4 cm, it is possible to make a smaller seat for a smaller person. 6 cm grid for 1,90 m etc..

I describe first these different templates with will stay for new project in your shop.

1) The seat template has several roles :

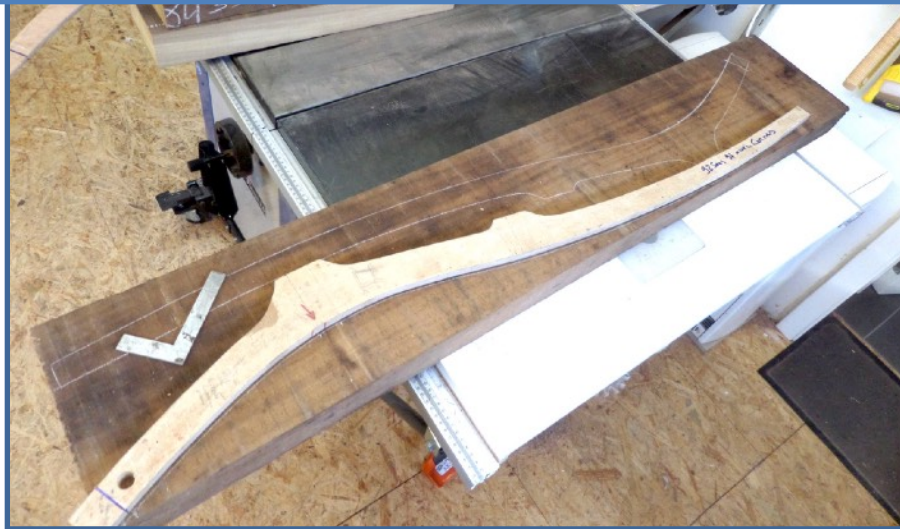
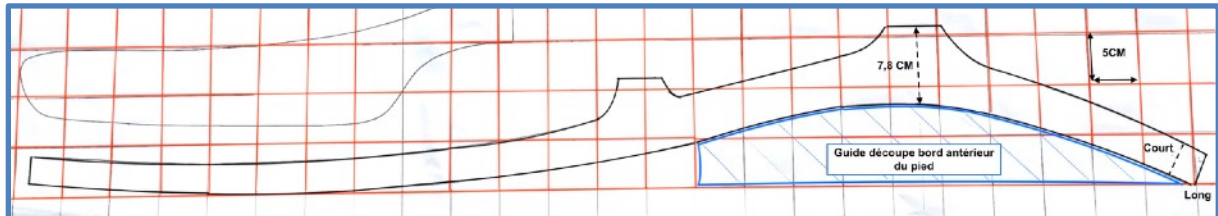
- the layout of the seat on the flows, axis and landmarks. to position the mortises of the front and back feet, and to guide for routing as show on previously picture



It is easier to make a half-template to change possibly seat width

2) The rear post template :

- It allows the drawing of the rear post, which will be bandsawed.
- It is also used to guide the shaper or router roller, to finalize the cut to the final dimension.

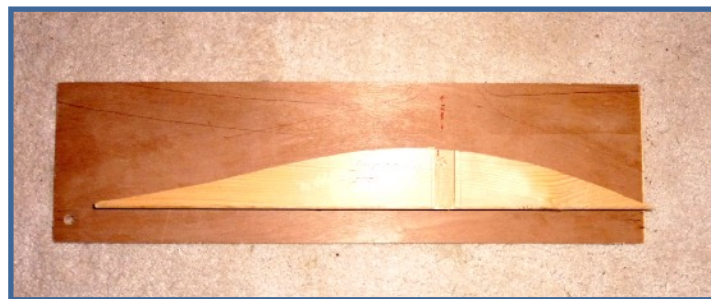
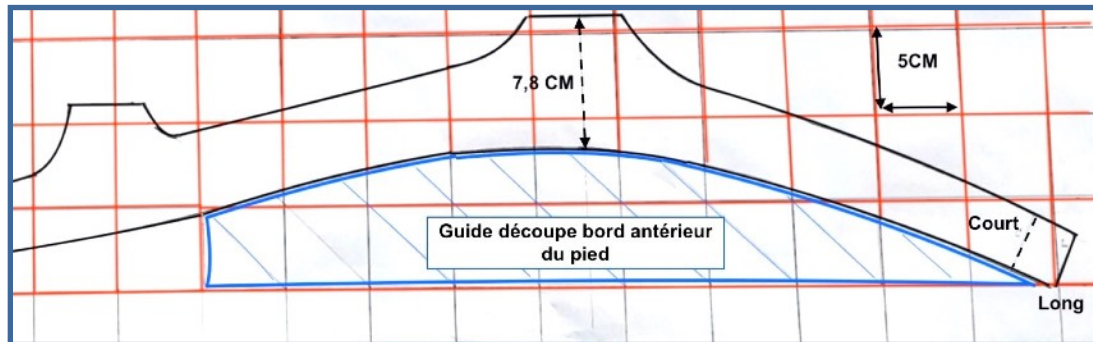


The two rear posts are reported on a piece 24 cm wide and 130 cm long.
After roughing with a band saw, these temporarily glued templates serve as a guide for the copy router bit. Here a "Big dady" from William Ng (L.A.).



3) Cutting guide of the front face of the rear post :

This template in blue, like the convexity of the rear post, is made from a paper layer glued on a piece of fir 5 cm thick. Associated with a plywood board, he makes a cutting template to cut the front edge of the rear post tenon on the table saw.



The distance between the convexity of the guide and the blade is 76 mm.

The 10mm plywood support is strictly parallel to the face to be cut.

The cut is then perfectly orthogonal to the axis of the post and the seat.

Rear mortise is the key of this seat, it's support 90% of weight bearing.



4) Bending form for rocker :

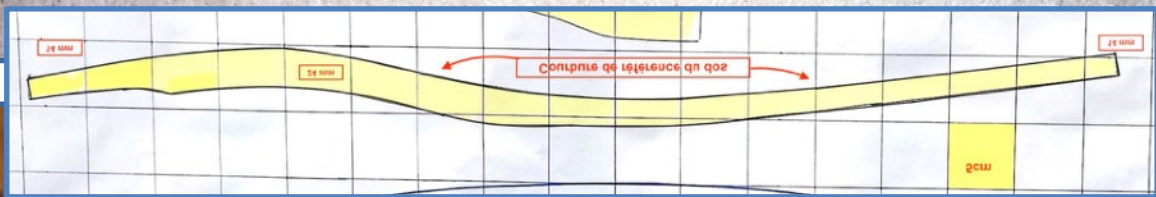
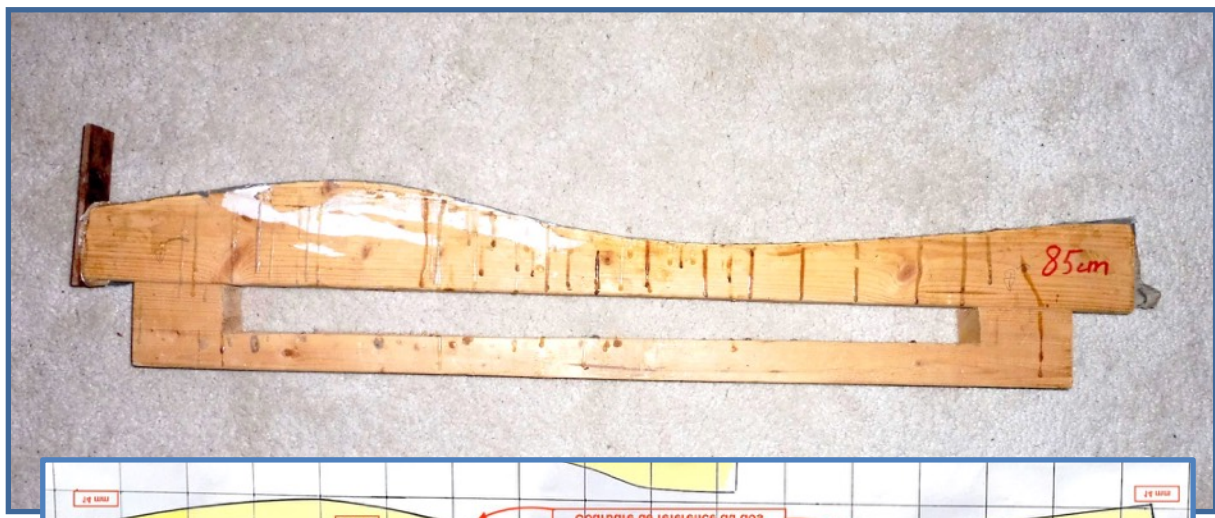
The layer of this form in page 85, is to be glued on a piece of pinewood 5 cm thick, and cut with band saw. This very massive bending template, is fitted with metal guides on the side and holes in its thickness to put the clamps. The 7 slats of 5 mm which constitute the rocker are modeled and glued on all their length, during 24 hours. It is possible to do it also horizontally.

Here a added piece is used to stall in the press.



5) Bending form of the rear slats:

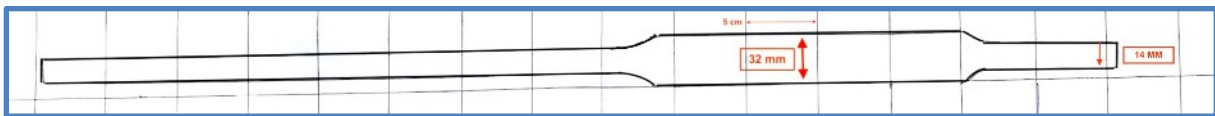
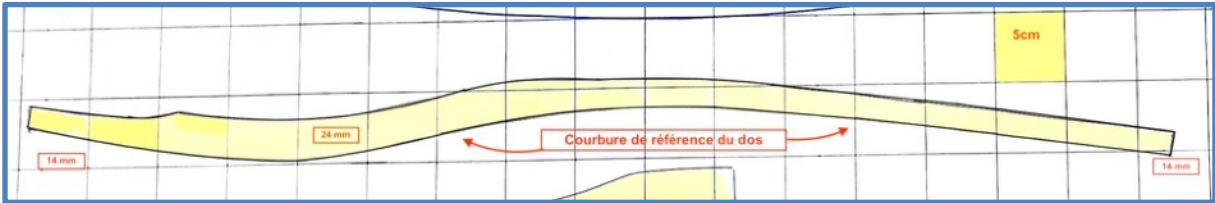
The 7 back slats can be made on this mold, one after the other. The paper reproducing the shape of the back will serve as a layer. This mold to make is of 5 cm thickness. It allows you to laminate 2 or 3 slats of 5 mm thickness and 32 to 34 mm wide, presented here with an added post to be wedged in the bench press. Laminated slats are a different version but easier to do, than the typical carved massive slats. Template reproduce human back shape.



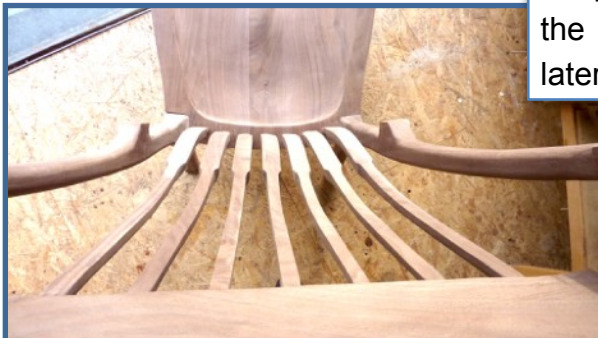
Laminated slats combining a layer of ash between two layers of walnut.

6)Templates form of the carved dorsal slats :

These two guides make it possible to draw, in both planes, the carved dorsal slats of 35 mm mm wide. These templates, will be traced free-hand on a grid sheet of 5 cm and glued on a sheet of MDF 5mm.



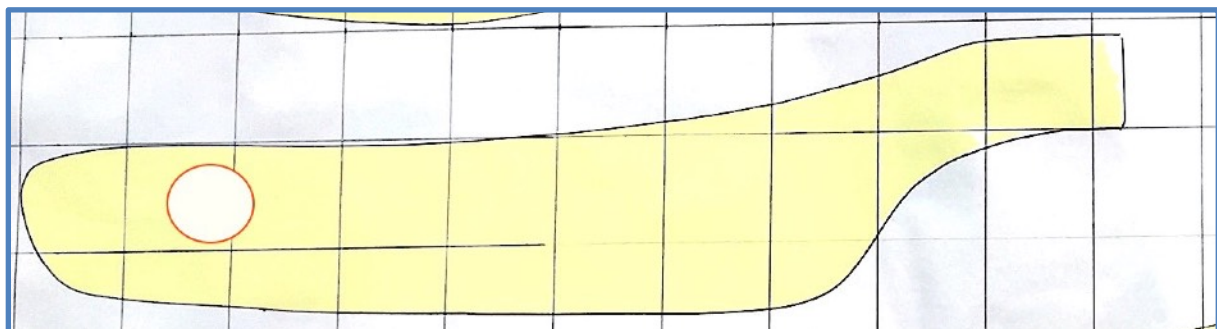
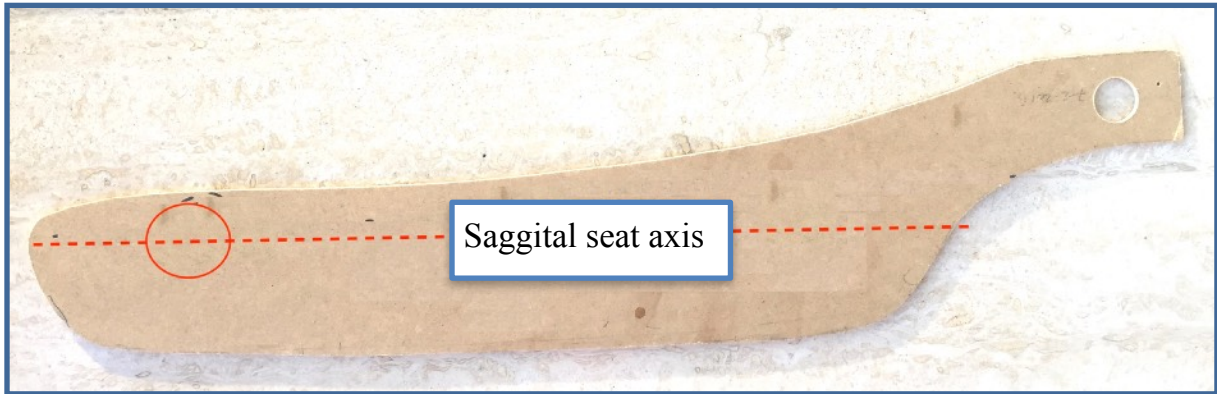
These slats are band sawed with the two template : first in the saggital direction, then in the frontal direction. They will be sculpted later.



The anatomic reproduction of the horizontal and vertical concavity of the back is an important comfort point.

7) The armrest template:

This guide is used to draw the two armrests, reverse it for both sides. It shows the location of the front foot, and the general axis in relation to the seat



This template is hand-drawn on a sheet of paper with a 5 cm grid. It will be carried on a sheet of 5 mm MDF.

8) headrest is drawn and built on, directly on plank according to your style :

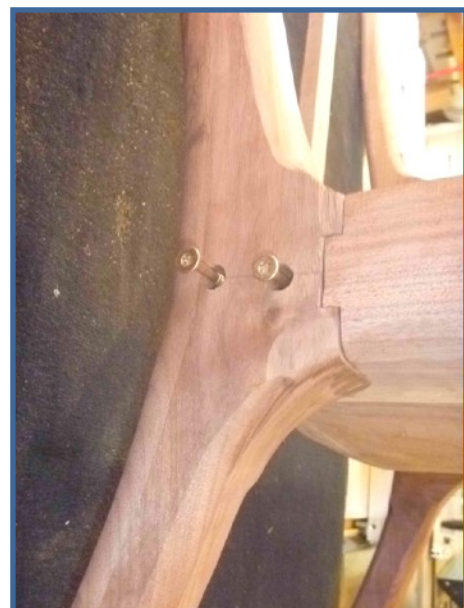


4) The manufacturing process:

It takes about 200 hours to complete this seat in its most recent aesthetic version. Some nice weather is needed to carve the grinder outdoors.

For a first seat it is better to do it in beech or cherry, easy to find in boards of 54 mm, sometimes even planed, which saves considerable time. This allows you to start again a piece, without regret.

A total of 16 different pieces must be made before assembly. Manufacturing requires that these parts are often done in several stages, with reserves to return to an adjustment. There are 14 screws: The screws are mainly used for adjustment, they will be put and removed very often, until final gluing. There are many round-trips on an adjustment, so you must be opportunistic, when you have a good exposure on a detail. The process described here has many repetitions, because the chronology of the operating times is precise.



Quite all machines and tools of a complete wood shop are needed, and will appeared in this text. A rotating suction sanding system Festool 220 and a Kirjès sanding system with pneumatic roller, are very useful. Gauges of angle measurements and depth measurements are necessary, at best electronic. It must be able to measure ½ mm and the degree of angle.

The parts to be produced are gradually, and often simultaneously :

- 1-The seat made with 5 pieces, quite easy with some tricks.
- 2- The 2 Front legs must basically be turned, then shaped.
- 3- The 2 rear posts.
- 4- Headrest. Made with one or 3 pieces of wood.
- 5- the 7 slats, laminated or shaped.
- 6- the 2 armrests , shaped with some boldness.
- 7- the 2 rockers laminated and shaped.

The adjustments are :

- The front legs and the rear posts in their mortises, very accurate .
- Headrest on the rear posts, very accurate.
- The back slats in the seat and the head support, accurate and tedious;
- The armrests on the front leg and rear posts, with eyeballed beginning.
- The junction feets-rockers with some sculpture .

The sculpture is done lightly with the adjustments, and finished after gluing for confidence. Sanding is done little by little. Gluing is done in several times spaced 24 hours: the seat itself, then the seat on the rockers.

The seat balance is done before the final gluing of the seat on the rockers.

The finishing is done on a week, between the different layers until the final waxing.

The chair becomes more and more heavy and cumbersome ..

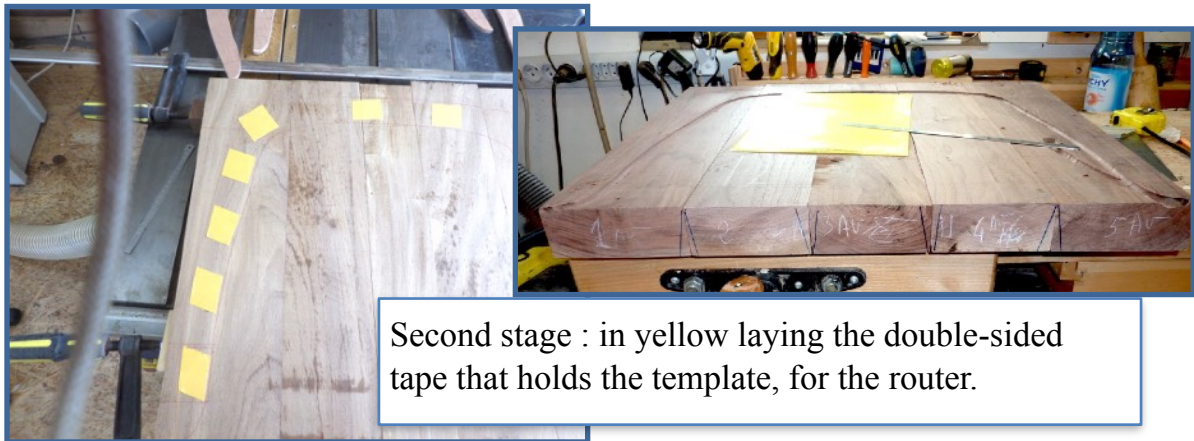
It is better to stop when one is tired to avoid a fatal error or the loss of the piece. The aesthetic sense must remain permanently awake. Wood worker skill increase really as time pass with this project.

Some authors glue very soon and shape immediately, its a tedious alternative.

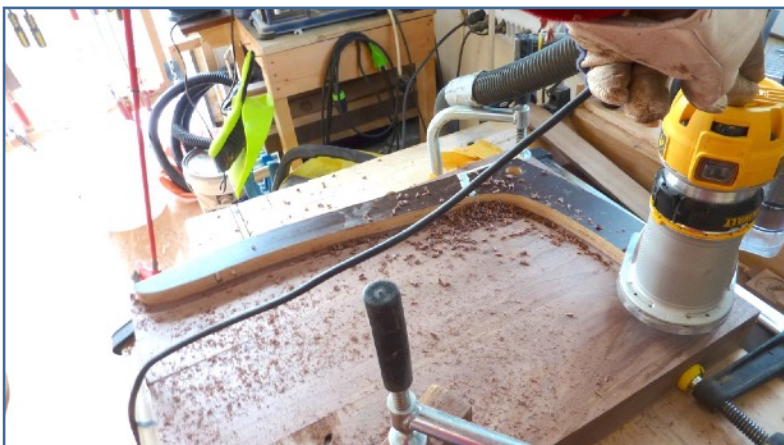


First stage : template draws the contours, positions the cutting lines of the front and back mortises, which are checked and aligned orthogonal.

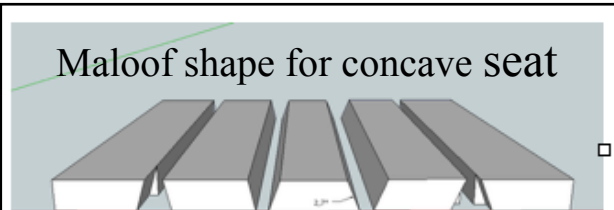
The seat can be simple plane, or concave, always **after** the tracing of a trench on flat surface.



Second stage : in yellow laying the double-sided tape that holds the template, for the router.

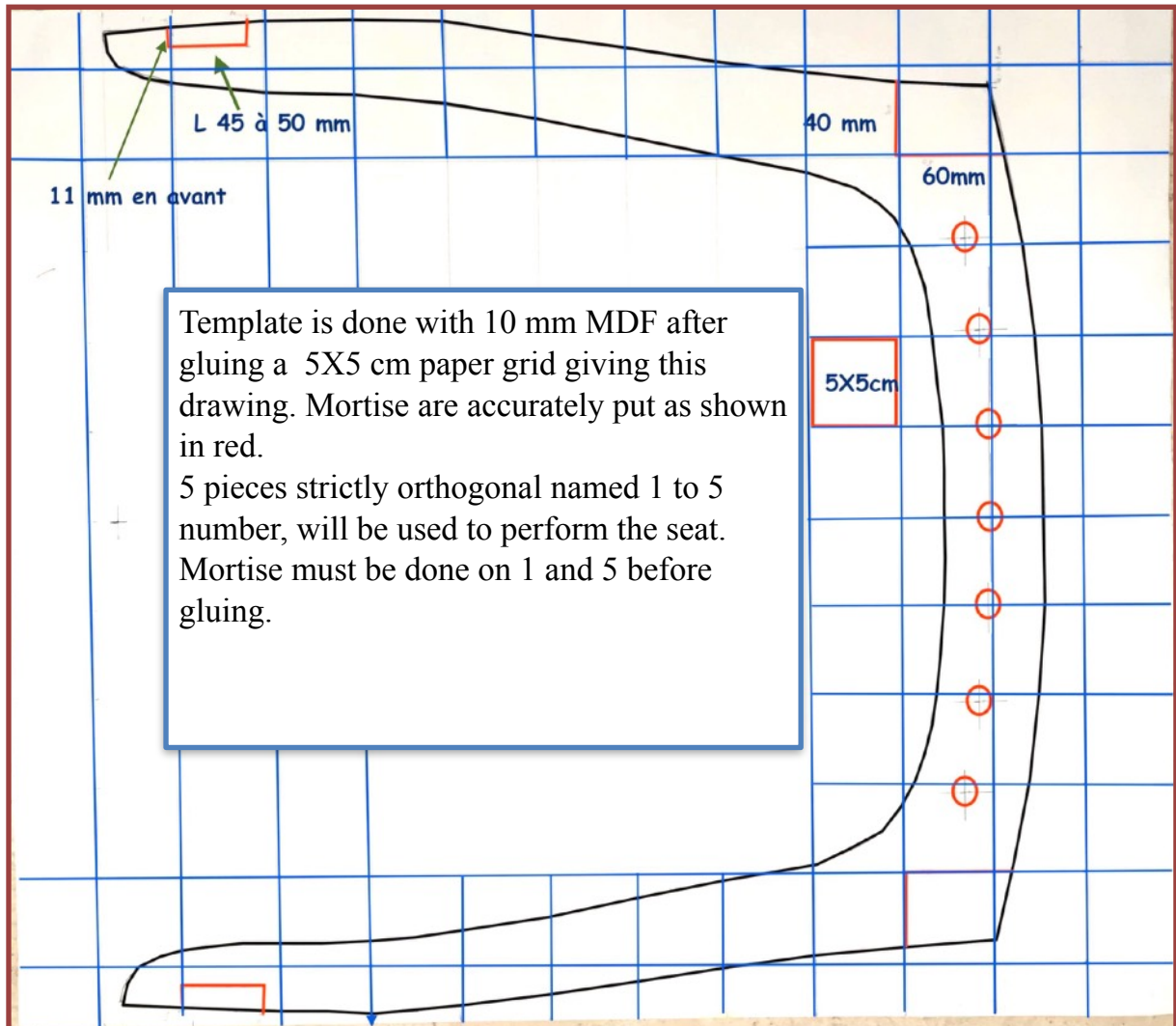


Third stage : routing the trench, here a more comfortable guide is fixed by double-sided tape, for a confection in two part, right and left. The trench is made on pieces strictly flat, blocked by two clamps. Seat wide can be choose initially with this half guide.



4th stage (optional) shaping for a concave seat.

3) Making the seat : as previous pictures.



1) Preparation of pieces and layout of structures :

The seat is made first, on perfectly planed orthogonal pieces (**The mortises and the sculpture will be detailed at the end of the chapter.**)

This template is essential, it can be copied on a sheet of paper 60X60 cm following a grid of 5X5cm. **There are two possible versions, flat or concave seat.**

- You can make a simple, flat version of the seat. It can be limited to a thickness of 55 mm. So, for a flat seat with: 5 pieces of 54 cm long by 12.5 cm wide. Numbered from 1 to 5 from right to left. Sawed perfectly squares, they will be glued by 5 Lamellos, or Dominoes in a time, **but after the realization of the mortises and the trench.**

- More typically , the recent seat version is concave, with a thickness of 60 to 64 mm, it is possible to dig a lot and get a very aesthetic shape :

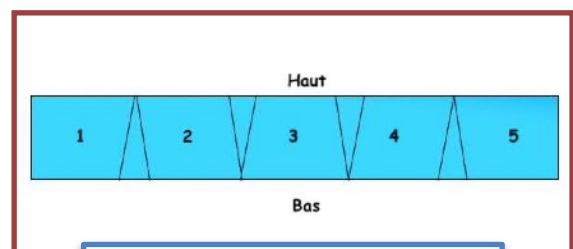
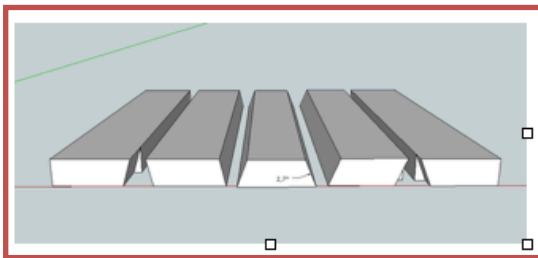
You need 5 pieces 54 cm long in 2 different widths, glued in 2 steps:

- The width of pieces number 1 and 5 is 14 cm, they carry the 4 mortises.
- The width of pieces number 2, 3 and 4 are 12cm.

They will be shape to 2.7 ° with the table saw following the diagram of Sam Maloof, to make the concavity, **after the realization of the trench and the 4 mortises.**

Flow number 2, 3 and 4 will be glued first on Lamellos, while the mortise is done on pieces 1 and 5 . On 2, 3 and 4 it is possible to dig with a band saw to gain depth on the sculpture before gluing.

The flows 1 and 5 will be glued on the central part 2, 3 and 4 after the making of the mortises



Sam Maloof genius idea



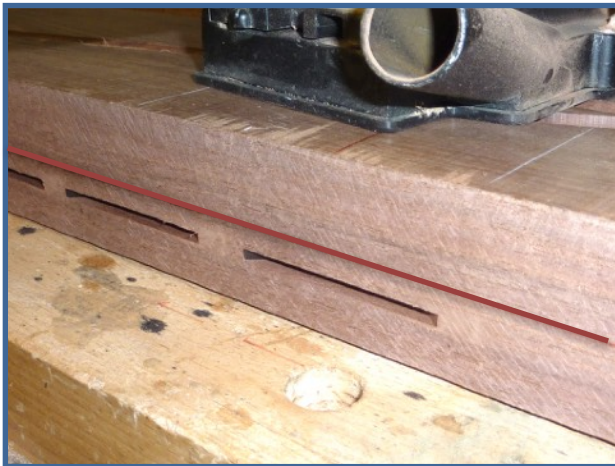
The making of a trench with the round of a 10mm router roller bearing bit , allows then, the departure of an easy digging. Starting from a simple line of pencil, with a flat disc, as classical, is very tedious with a risk of false consequent road and the ruin of the piece. Aesthetic is also lightly different.



Pieces number 2,3 and 4 are thinned with a band saw to facilitate digging. **Calibrated drill pressed depth holes will serve as a visual limit to future digging. Penetration holes are 15, 20, and 25 mm deep, according to the aesthetic choose.**



Here a concave seat with its mortises, is ready to be dug. The center has been thinned, the placed holes give the depth not to be exceeded. 25 mm regarding the deepest seat point of sitting. The side edges are still present, they will be cut later after the realization of the 4 legs, adjustment and sculpture. The anterior edge is ready for sculpture.



The low position of Lamellos keep in mind the digging to come. The red line gives an idea of the maximum possible digging. Possibly 4 Domino at the rear back base, offers more resistance, between 1 and 2, 2 and 3, 3 and 4, and between 4 and 5. According to your initial thickness, you can decide position and depth of control holes



The guide of the Lamello device must follow the inclinations of the pieces ...

For the making of a concave seat, the use of a magnetic electronic gauge makes it possible to perfectly adjust the inclination of the blade on the table saw, here 2.7°. A good saw blade do the job.





This common architectural drawing rule will also be used for the drawing of the headrest, and other shape. Turning it, gives easy symmetrical curves.

2) According to these previous pictures, the chronological stages of the seat are :

1) Aesthetic assembly of wood fiber : synchronization of the wood grain in an aesthetic way, according to its taste and numbering 5 pieces from right to left, with a triangle of marking with chalk on the upper face.

We must choose the wood designs and coordinate them, make the most of the aspects in 3D, and avoid sapwood as much as possible. If there is sapwood on two pieces, associating them edge to edge gives a nice effect (sometimes).

2) Draw the seat using the template, locating the axes, the middle, the mortises. The 5 pieces are locked flat by 2 large clamps. Drawing of the front edge with an architect's rule.

3) The template, or a similar router guide (10mm thick) is then fixed with double side tape..

4) Making of the trench with the router. The orthogonal flat parts are secured by a large clamp. A 10 mm thick inner edge serves as a guide for the 10 mm roller bearing. It is a personal method, which guarantees an easy sculpture with a grinder.

5) Then the procedure is different, for a flat seat :

- Making Lamellos junction in general 5. I put a single domino back, to avoid misalignment
- Placement of holes fixing the depth of the sculpture symmetrically (10,15,20, and 25 mm according to the geography of the digging)
- Thinning of central parts 2,3 and 4 at the band saw (optional).

- Making of mortises at the 4 corners (they are described further).
- gluing the seat 24 hours on presses, well flat.
- cutting of the front edge of the seat, with band saw.
- Sculpture with grinder (from hard to fine grit)
- return to the workshop for refining and making the legs tails.

5) Procedure for a concave seat:

- Making mortises on parts 1 and 5, as long as they are still orthogonal.
- Placement of holes (10mm diameter) limiting the depth of the sculpture, implanted symmetrically (10,15,20, and 25 mm depending on the geography of the digging).
- Thinning of the central parts 2,3 and 4 with the bandsaw.
- Edging at 2.7 ° with a good quality blade, following the pattern of Sam Maloof. Trapezoidal pieces are created.
- Placing Lamellos by incorporating the inclination of the slices on the device.
- First gluing parts 2,3 and 4 for 24 hours.
- Gluing WELL FLAT parts 1 and 5 provided with their achieved mortises, on the central part (2,3 and 4). So the orthogonal structure of the seat is respected.
- Cutting the front edge of the seat, with band saw.
- Sculpture with the grinder, outside with good weather if possible.
- return to the workshop for refining and making the leg tails.

6) This gives a seat perfectly flat on its edges, with its mortise and ready to be carve.



Here the side edges must be still present for the double mortise to be achieve later.



Some aspects:

Layout draw on piece Number 2 for the band saw, before gluing.

The depth and location of the lamellos, and depth mark holes, can be appreciated.



Pieces Number 2, 3 and 4 were glued, while pieces 1 and 5 received their mortise.



Gluing strictly flat of pieces number 1 and 5, on the 3 central parts.

The press plan serves as a reference



Left

The 10mm round router bit draw a perfect symmetrical junction at a special point of the sculpture with the edge of the seat.

Under

The 10mm diameter holes set at 10.20, and 25mm will be a visual depth marker when digging with the Arbortech disc, or a conventional disc.

Under : Piece N ° 1 of a Beech seat ready to be glued. It has its mortises, we see the rear Domino and 4 Lamellos.



A set of fine tuned Afrormosia wood at the beginning of a rocker (African teak), and its evolution .. A lot of wood has disappeared.



3) Sculpture of the seat

The digging time of the seat aims to achieve a harmonious rounding behind the seat, followed by a slow rise to the front, drawing in the middle a spur gently connected to the rounded anterior edge. This gesture requires a little daring, because it is quite atypical in woodworking, fortunately it is quite fast and easy to do. The prior digging of the trench described above greatly facilitates this sculpture.

The digging of the seat is done for me, outside because it produces huge amount of chips and dust. This gesture requires great protection, apron, gloves, ear protection, filter mask and turner helmet. I sometimes place a fan to deflect the chips on the side.

This dig is done in three times fast enough if you have the appropriate equipment.

- First of all with a grinder equipped with a TURBOPLANE ARBORTECH disc

This disc is particularly suitable, but not mandatory. It removes large amounts of material chips, without tending to sink. It does not cut on its edge, so it is easy to go down the trench, leaning moderately on it. This allows a perfectly rounded hollow and tangent to the rim. Pre-positioned holes give the visual depth limit not to be exceeded. It's a time that lasts about twenty minutes. It leaves a rough surface that will be refined by conventional discs afterwards. A single grade 40 or 60 disc will also do the trick, starting gently down first. Then 120 and 180 grain discs still outside. I have a set of 3 grinders dedicated for the job, so a continuous work can be achieved. Underside must be shape on a first look too.

Then the seat returns to the workshop for finishing with a FESTOOL 220 orbital sander under suction, going up to 220.

The relay is taken with French chair rasps AURIYOU and LIOGIER 9 and 11 to sculpt the front edge. It is possible to go far enough in finishing .. It is necessary to make both sides obviously.





Turboplane job achieve



After sanding at 120 grit, you can see the bottom of the reference holes which allow a symmetry in the digging. Then the orbital sander Festool 220 is an asset to advance very quickly in depth and quality. The Kirjès sanding system is perfect for rounding.



After doing the tail on the legs, lateral sculpture can begin. Here slat hole are present.



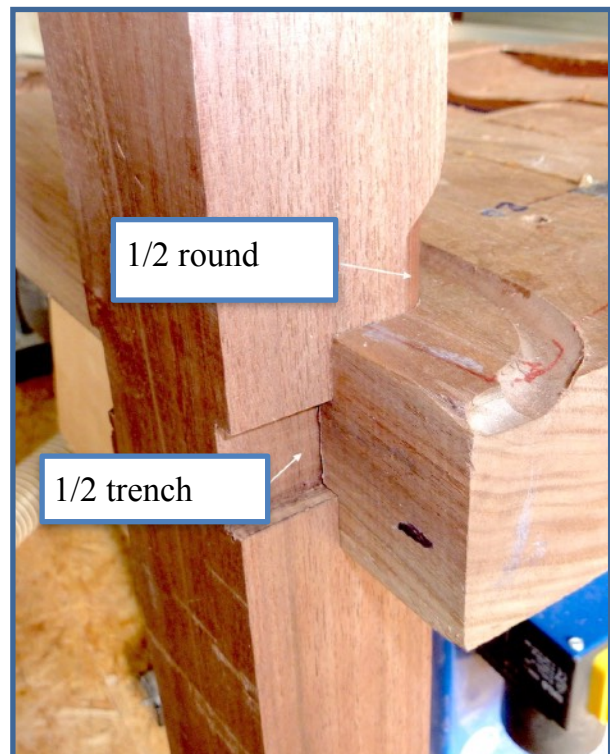
4) Making the Sam Maloof « double mortises » of the seat :

It is described here within the natural progression in the making of the seat. This mortise is quite easy to make, but requires specific router bits to be achieved.

Here In the rear part this mortise must in addition, ensure an inclination of the rear post, which must be integrated in the manufacture, thanks to 2 specific bit integrating a 5 ° angle positive and negative in the original technique from Sam Maloof.

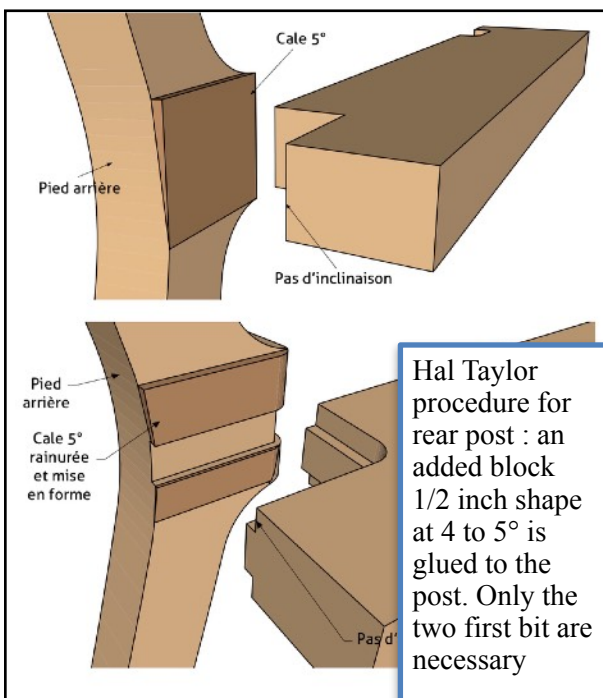
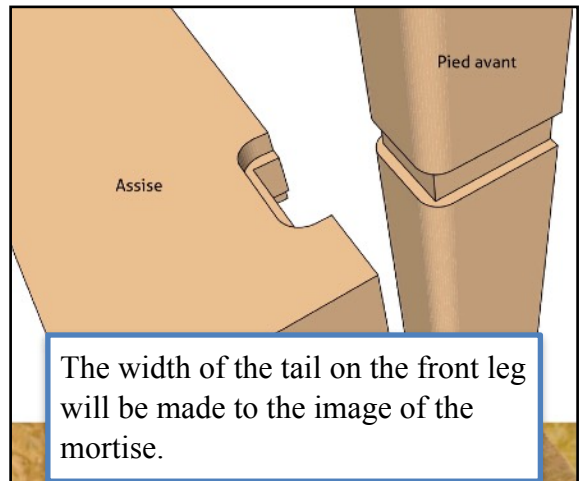
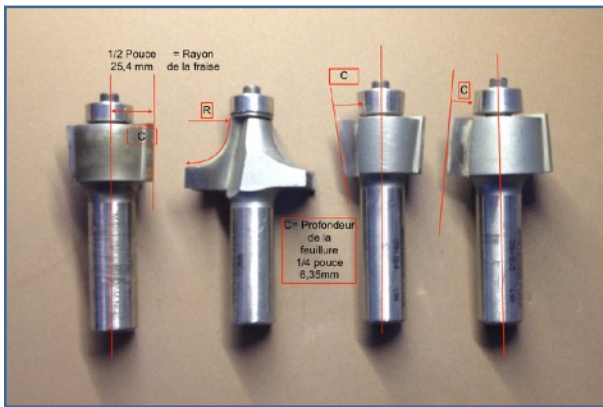
But there is an artifice used by **Hal Taylor** which greatly simplifies the procedure, if you don't have these specific 5° bits.

At the front leg, the purpose of this mortise is to ensure also an aesthetic overflow of the front foot, so it's rather not deep.





Over size thickness authorize extended shaping in sculpture.



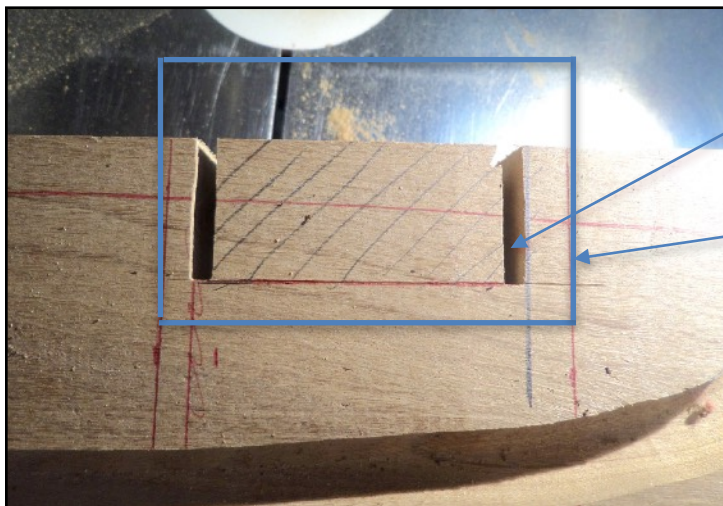
A) FRONT MORTISE

I will describe further the making of the corresponding tail during the making of the front and rear feet. In any case, the dimensions of these future tails to come, are determined by these mortises.

We will work on the pieces 1 and 5 perfectly square, before gluing them to the seat . The seat template have positioned on piece 1 and 5 the location of the 4 cutouts of the front and back mortises. Front mark is really short, only 14 mm from the drawing line on the front.

1-The mortise start with an orthogonal cutting of the piece. The length of the cut must take into account the corresponding dimension of the available dimension for the front leg minus 2X 1/2 inches. 1/2 inches is the radius of the rounding bit.

This give 47 mm on average for a corresponding front foot section 60 mm.



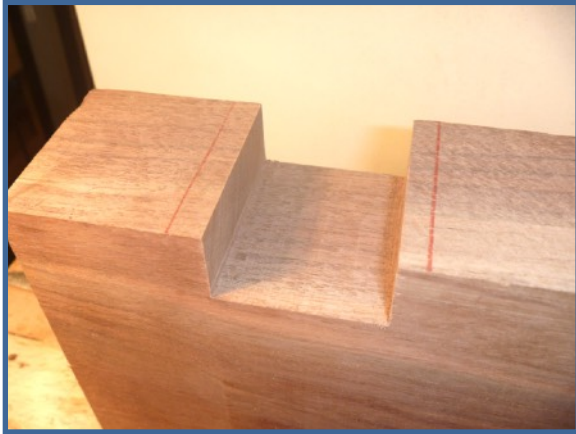
Depth in very limited on the

front at 14 mm, from the outer line of the template.

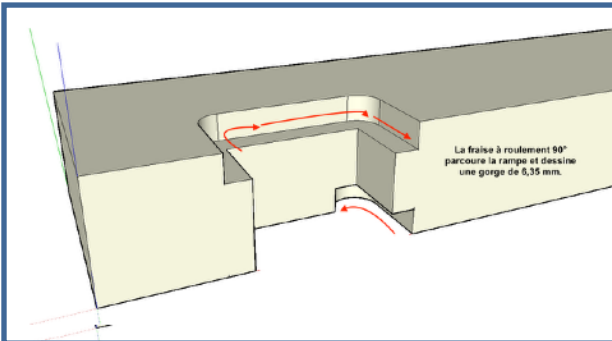
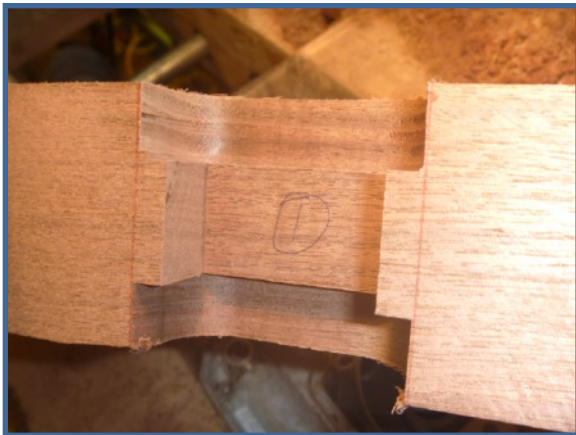
Front leg 60X50 mm.

Cutting is done on the table saw. Band saw remove some stock, and flat router bit end the job to give a perfect flat area to the future front leg tail



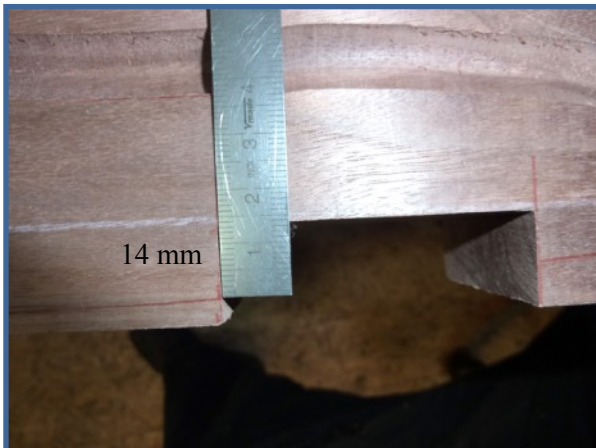


The mortise is done on both sides successively by turning the workpiece, and respecting the direction of rotation of the 6.35mm rabbet bit. The cutting height is about 1/3 of the thickness. A protection piece at the exit avoids a splinter of wood. This is the reflection of the ball bearing in the corner of the cut, which



draws in the bend, this round so typical, 1/2 inch (6.35mm). In this round the chamfer of the foot will be lodged, and achieve this beautiful interlocking.

This is the secret of this mortise.

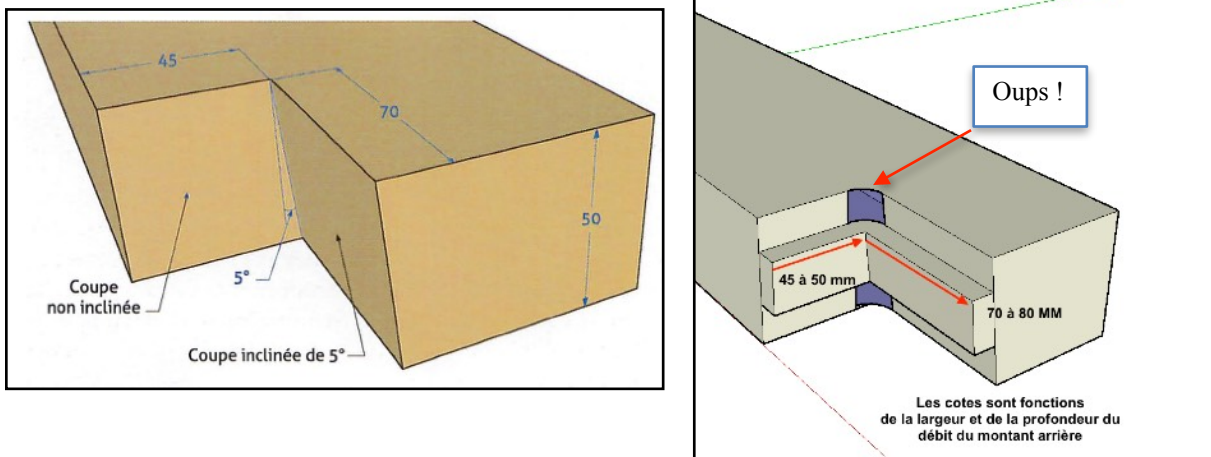


B) The rear mortise of the seat is more complicated:

The back mortise is 7 cm long on average, 45 to 50 mm wide (depending on the thickness of the planed post). It must give a 4 to 5 degree angle of inclination to the rear post. There are two ways to do it, either like Sam Maloof or using the Hal Taylor artifice, I find on You tube video. This artifice much simpler, does not ensure a perfect continuity of the wood grain at the round sculpture.

A) SAM MALOOF procedure need 3 different Whiteside router bits : 90°, - 5° and +5° :

It is necessary to start from a perfectly square cavity on the surface, which integrates a 4 ° inclination as follows:



1) The cutting is done in two stages, anterior edge, then back edge on table saw:

Outside on the outer edge of piece 1 and 5: the cut is done at 90 ° with the table saw, or with the band saw.

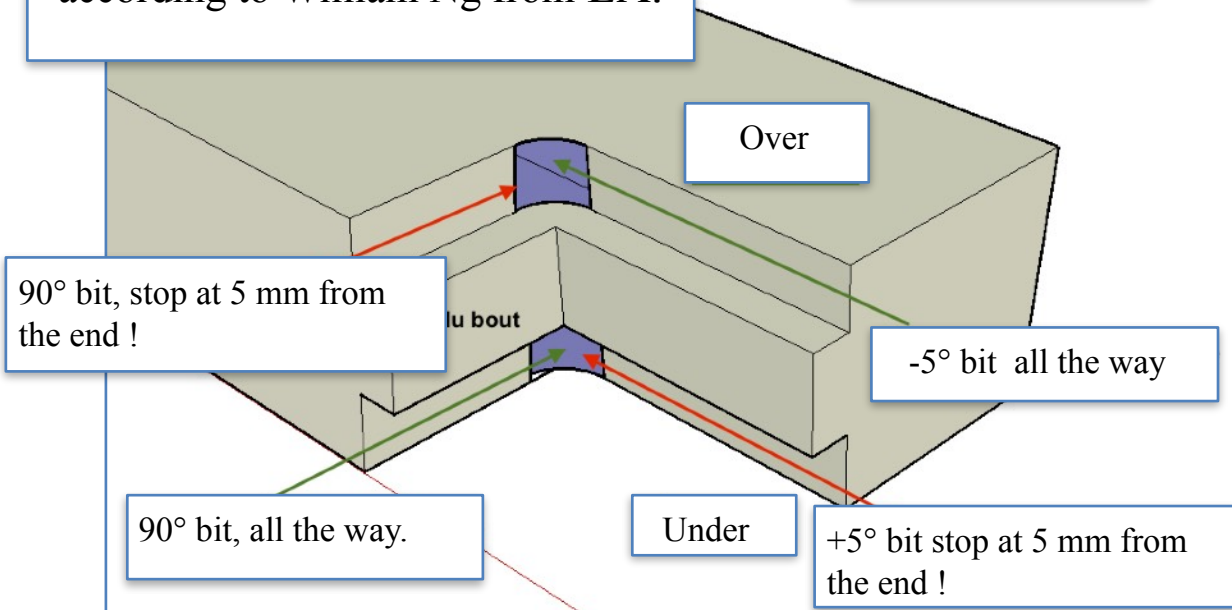
2) But behind, on its posterior edge : it 's necessary to create an orthogonal slope of 4 ° on 70 to 80 mm. It is therefore necessary, with the table saw of a large blade, the part in vertical position, with a cutting guide set at 4 ° or 5 ° (it is difficult to know if it is exactly 4 or 5 ° ..) like Sam Maloof.

Or this cut can also be done may more easy with a band saw, the table being tilted at +4° , then - 4°.

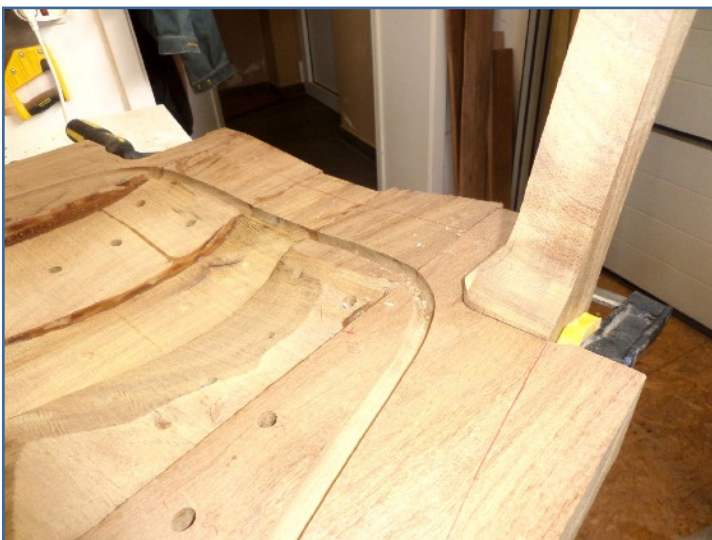
The trouble on the rear mortise is to avoid a bad aspect of the superficial angle, made of an extended hole involve with a too long travel of the router bit. William Ng tell me this artifice, so at the end, the rear junction with the rear post 1/2 inch rounded shape is perfectly done.

Methodical tracking of router bit according to William Ng from LA.

Left side number 5



Rear view at perfect Sam Maloof rear left double mortise, including rear post outside bending.



Front edge here, is perfectly achieve with some thickness which authorize nice shaping.

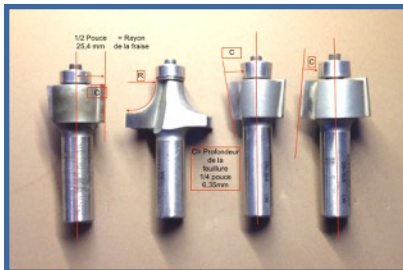
The seat is ready for carving, and digging. See the reference holes and band sawed reduction in thickness, on 2,3 and 4.

Lateral side still present.

The milling then alternates the three router bits 90 °, -5 ° and + 5 °:

There is therefore a schematized order of passage in the following diagram, in which it is necessary to stop 5 mm before the angle without sinking into the angle, to create an aesthetic round, especially on the upper face. Excess travel causes an unsightly notch. So the sequence is :

- 1) At the top in front, 90 ° router bit stop at 5 mm from the opposite edge, do not go to the end (roller bearing don't touch the end)
- 2) Underneath front 90° router bit forwards all the way to the end.
- 3) back over , -5 °router bit on the upper edge, all the way to the end (roller bearing touch the end).
- 4) back under ,+ 5 °router bit on the bottom edge, stop at 5 mm, do not go to the end.



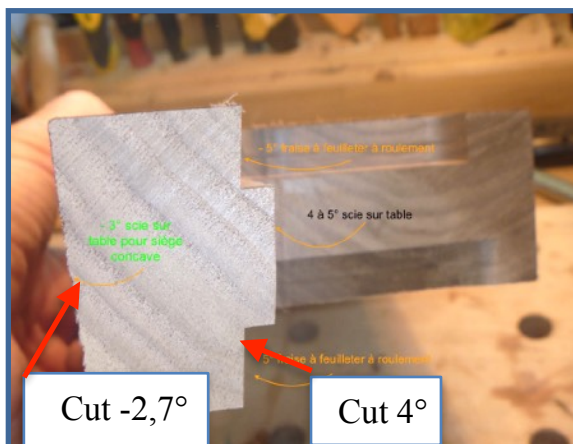
<http://www.whitesiderouterbits.com/>

1) Chair Making bit 1/4" depth of cut 5/8" cel, 1/2" Shank : *part#09-165*

2) roundover ball bearing guide : *part # 2009*

3) 5° Chair bit 5 degree taper, 1/4" depth of cut 5/8" cel, 1/2" Shank : *part#09-163*

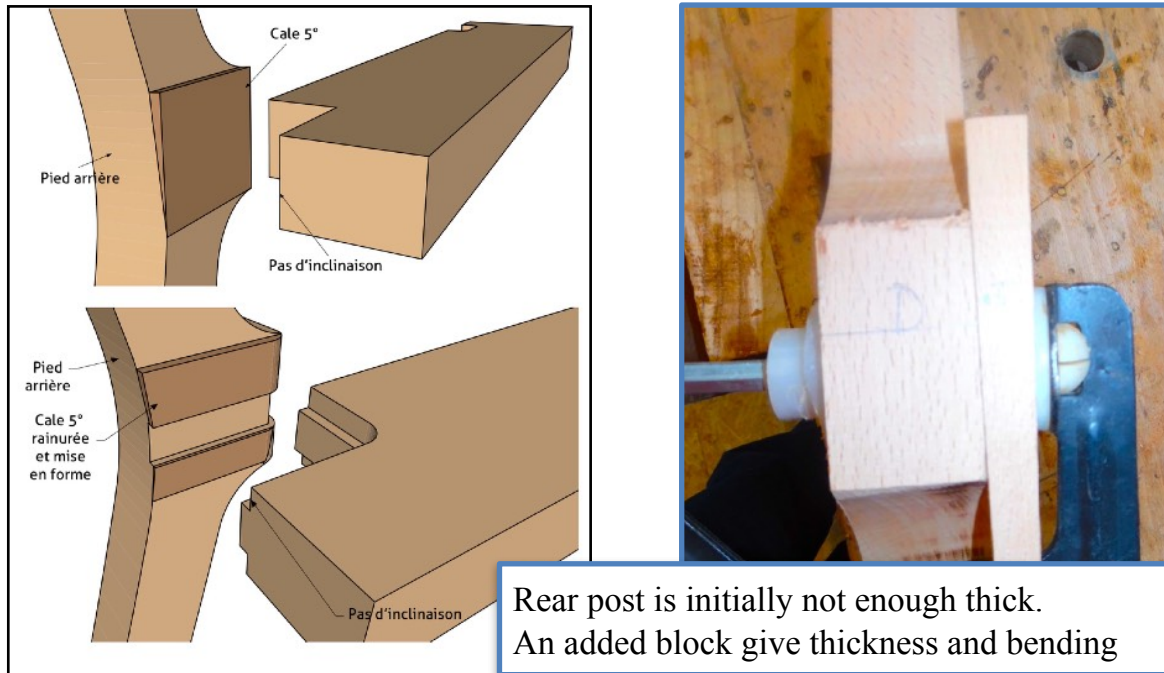
4) 5° Chair bit 5 degree Negative taper, 1/4" depth of cut 5/8" cel, 1/2" Shank : *part#09-164*



B) THE HAL TAYLOR procedure requires only the first chair Making Bit at 90 °, it starts from a simple orthogonal cut :

A 1.5 cm thick piece, 10 cm high and 8cm deep is cut between 4 and 5 °. It is glued before on the inner face of the rear foot. This ensures the inclination, the tenon of the back post will be all at 90 ° as see later.

All the seat mortises are done with the same 90 ° router bit 1/2 inches rounded.



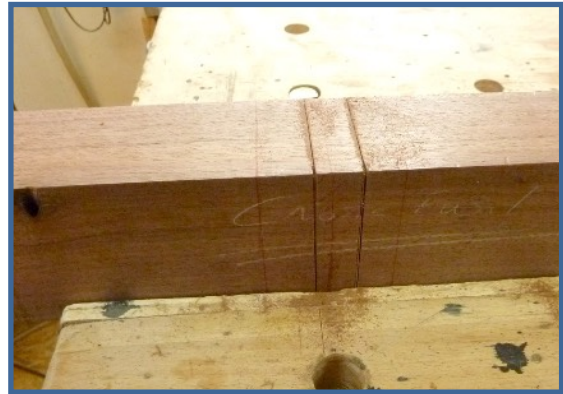
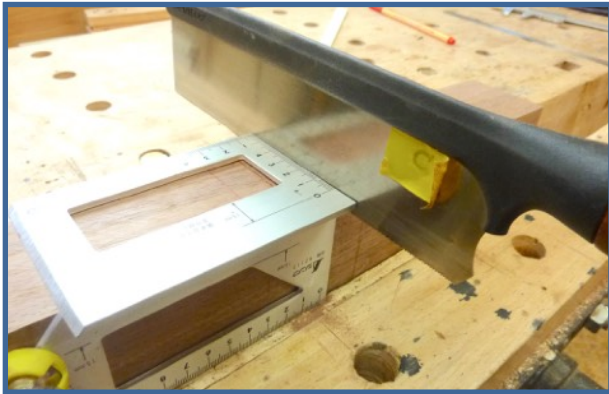
Hal Taylor assembly on a French « Provençal » rocker. The wood fibers of the additional angled piece should follow those of the rear post, to avoid carving against the fiber.

4) Front foot :

There is no template for the front leg, it is piece of 54 cm long perfectly square, with a tail corresponding to the seat mortise. This piece will then be turned and adjusted to the seat sculptured by a soft connection. Above and below a hole of 10mm will allow the establishment of a connecting dowel to the armrest above, and the rocker underneath.

The transverse thickness is at least 54 mm, it is also possible, at this level to stick a plate of 1.5 to 2 cm to gain thickness and roundness.

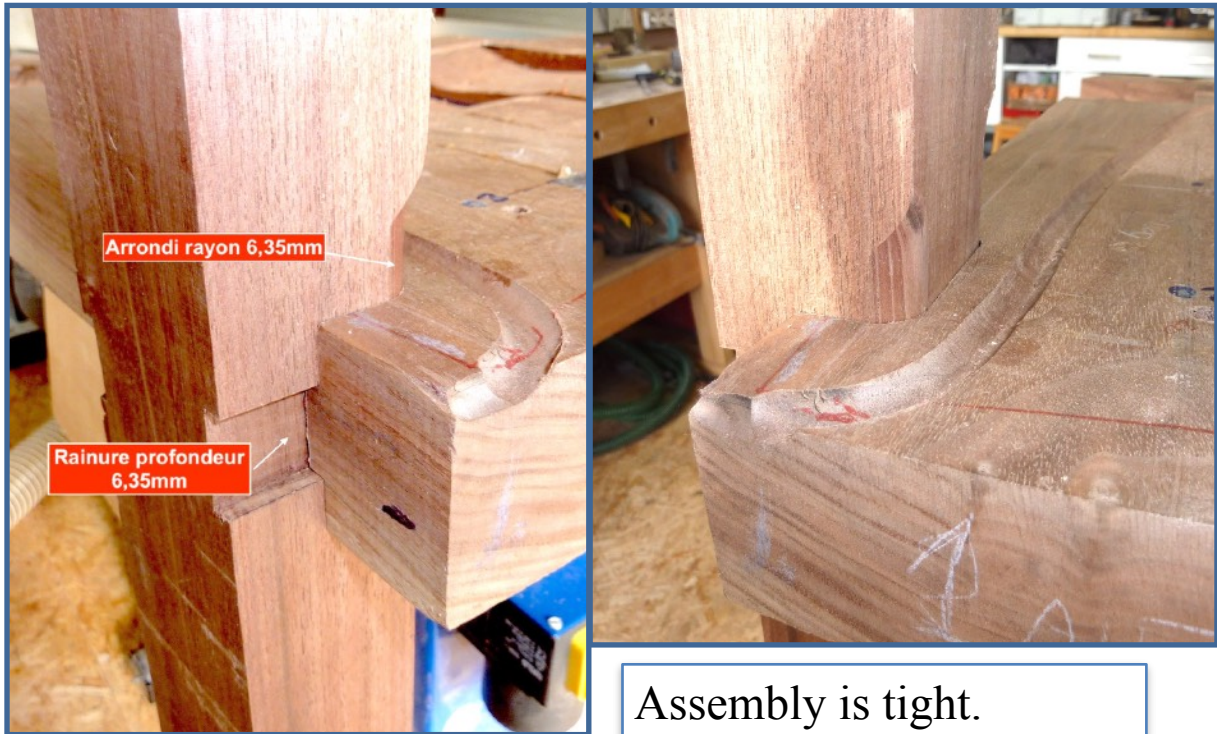
The following images are preliminary to the chronological procedure described at the end of the chapter..



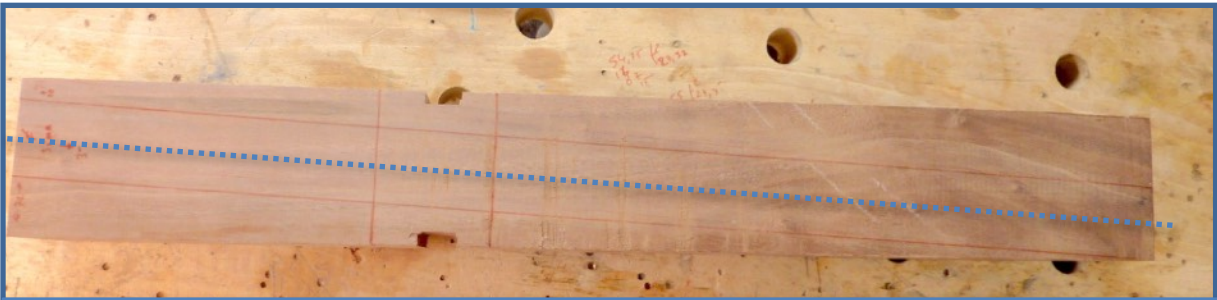
The 1/2 inch trench is made 19 cm from the top on 3 sides. It is constantly adjusted to the regarding seat's mortise. Its edges are rounded with 1/2 inch round router bit.



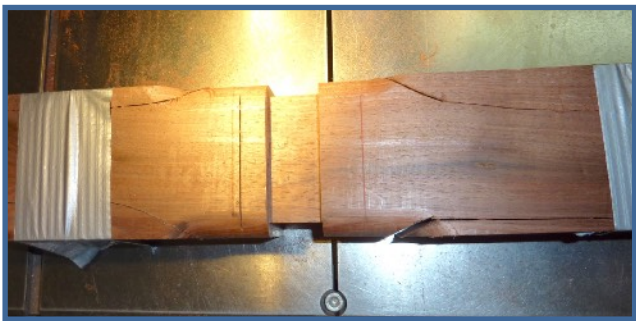
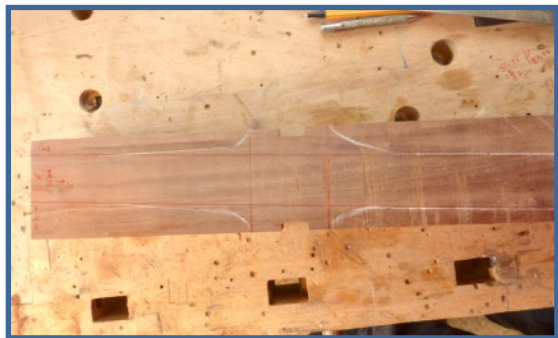
The bottom of the groove is finalized with a flat bit in two passes measured a little beyond 6.35 mm (1/2 inch). The edge is rounded then, without sinking into the groove.



Assembly is tight.



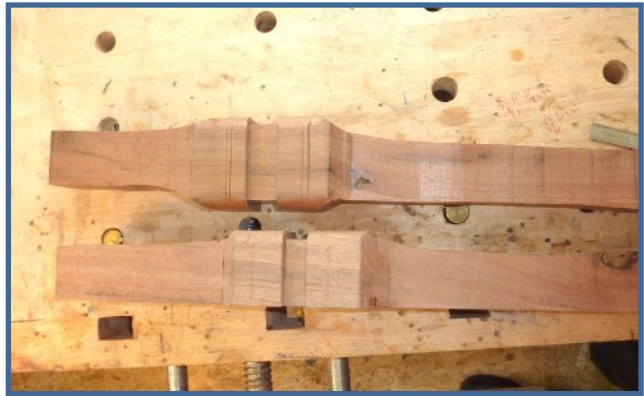
Preparation for turning. To give some front bending effect I fit an eccentric axe.



Caution ! **The piece will shake on the lathe**, it must be thinned with a band saw to facilitate the turning. There will be less wood to remove on the lathe. The following images explain the procedure.

In the original seat the front foot is orthogonal to the seat in the frontal plane, so for the turning it is necessary to mark a circle of 37 mm well oriented, at each end, tangent to the outer edge of the piece. That 's the normal way.

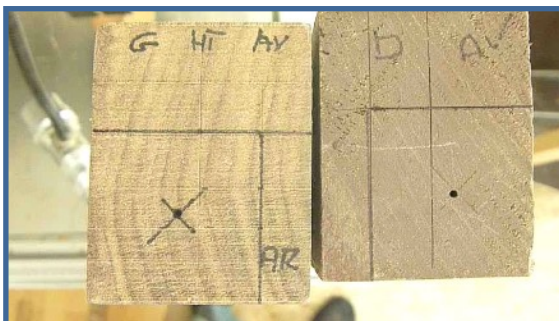
Personally I make an eccentric turning in the frontal direction, to give a "dynamic" inclination to this piece. So for this type of turning, it 's necessary to mark a circle of 37 mm at both ends, differently, either at the top: outside and behind, and at the bottom: outside and in front of the piece.



Eccentric turning to give a little sagittal inclination to the foot. The future cylinder with the sculpture is spotted. The excess is removed by band saw. The final diameter at the top and at the bottom is 37 mm. It will be slightly reduce to 34 mm with sculpture.

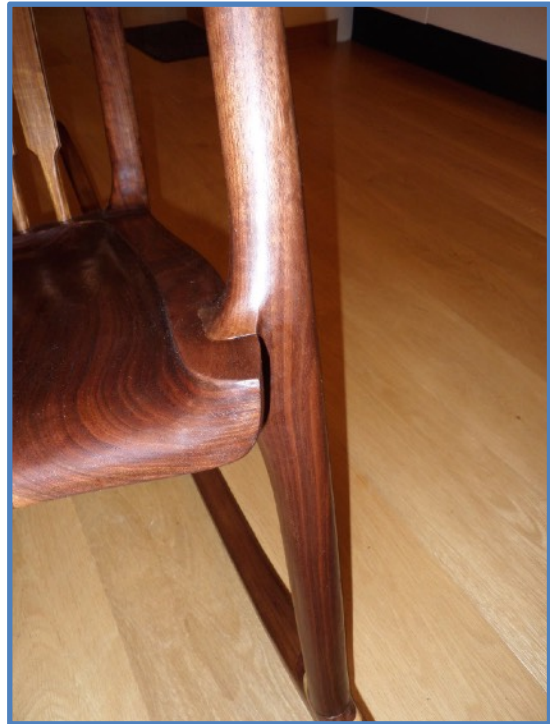


Some authors shape and sculpture after gluing. I prefer to shape each piece very far previously, on my bench , and finalize the sculpture after gluing the seat.



Spindle location, top edge of Left and right leg - for eccentric turning . Otherwise should be at the middle.





A drilling gun for 37 mm external diameter, allows to make a hole for a 10 mm dowel perfectly focused, at the top and at the bottom of the leg.

- Chronology of a front leg making of :

- 2 basic pieces perfectly square , nice figured : 54 cm X 5.5 cm X 6 cm
- 6 cm is the anteroposterior dimension, it corresponds to a mortise of 47 mm shaped in the seat. The more you increase this dimension, the longer the carved junction will be long and beautiful, but do not go beyond 6.5 cm. These pieces , marked Right and Left, are carefully adapted to the mortise of the seat, slightly tilting the piece to test the future interlocking. A hand planer stroke on the area allows adjustment, so it is useful before to overstate with this dimension (6,1 to 6,2 Cm)
- In thickness, 5.5 cm corresponds to the supply of the planed stock. It is possible to glue next to the mortise a piece of 1 to 1.3 cm thick and 80 mm high, to give more volume to the junction and thus allow a rounded sculpture more marked. A 6cm stock thickness give a better round sculptured shape.
- These two legs will be chosen in the most beautiful wood and the most figurative by trying to match the wood grain between them in symmetry, and also with the underlying seat fiber.
- The technical times have been mentioned in the previous images:
- strictly orthogonal working with in particular an interlock tested with the mortise on its edges, obliquely.
- Making the trench of the tenon with the saw and the router, its height corresponding to the mortise of the seat, its depth 6.35 mm. **This trench is 19 cm from the top of the front foot, which measures 54 cm.**
- Rounding of the medial edges of the tenon to radius 1/2 inch.
- Preparation for turning, locating centers.
- Turning in aesthetic gradient, avoiding giving a pipe look.
- Laying a dowel hole up and down.
- Adjustment and one screw fitting (65x6 mm TORX). Could be 2, like Maloof.
- Sculpture.



The center of the double tenon trench will be made 19 cm from the top, it's the image of the mortise seat. Its depth is still slightly greater than 6.35 mm (1/2inch) flaw. The 2 middle edges facing the throat will be rounded off with the 1/2 inch round cutter that is used for all times of this seat. (don't sink in the groove).

A hole is made with the drill press , according to your choice of screw and the head diameter. Some put two screws. These holes are enlarged for me to 9.5 mm (3/8) to hide an embedded screw, which will be plugged at the end of manufacture by an ebony dowel. I put in place a Torx head screw. The Torx head allows successive assembly and disassembly without damaging the head. This procedure authorize very advanced shaping before gluing.

Two distal center turning point are choose. Turning is done laterally, so to leave at the top and bottom a circle of 37 mm. As a result, the beginning of the turning is delicate because the asymmetric piece will shake a lot on the wood lathe. The best is to rough it off with a band saw by removing beforehand, which will leave anyway.

I do an asymmetrical turning, also in the sagittal plane, which gives once the foot in place, an inclination of about 3 ° towards the front of the foot, giving a nice dynamic profile effect. On the piece I just center the circle 37mm up, back and out; and down, forwards and outwards. Otherwise basically center the point of turning for a 37 mm diameter up and down centered on the side of the stock.

While turning we have to go far enough in finishing the foot down and up to 37 mm radius, and avoid a tube effect due to insufficient gradient. For ease and not to fight too long with the oblique flat gouge on the lathe, I use an old sander fitted with 80, 120 and 180 grit disc. After sizing and stabilizing the diameter at 37 mm at the ends, the turn on, I sand up and down to get a nice gradient that is almost finished, to have a perfect surface, while the piece turn on lathe.

Two dowel holes 10 mm in diameter and 30 mm deep are drilled at the top and bottom, The upper hole is for the armrest, the bottom for the rocker. I made a guide to 2 guns 90 ° and + 4 ° for this use, adapted to the diameter 37 mm. The first at 90 ° is for the front foot, the second barrel inclined at 4 ° outside, is for the back foot which implants dowel straight on the rocker but with this angle involve in the rear foot..

The feet are fixed on the seat with screw, then comes the time of sculpture to achieve this harmonious junction between the rounding of the foot and the side of the seat. This sculpture will be detailed in the chapter "sculpture" and it presents no particular difficulty.

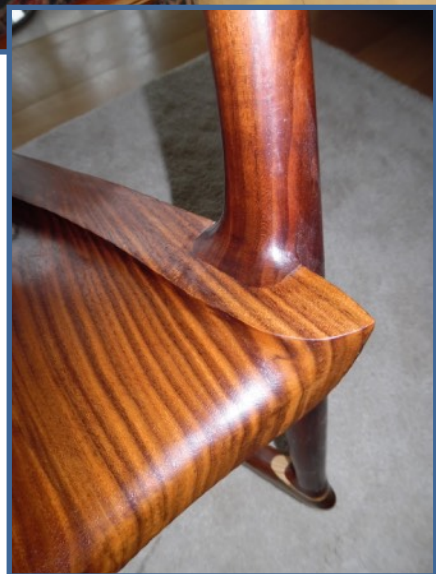
It takes a good ten hours to shape these front feet.



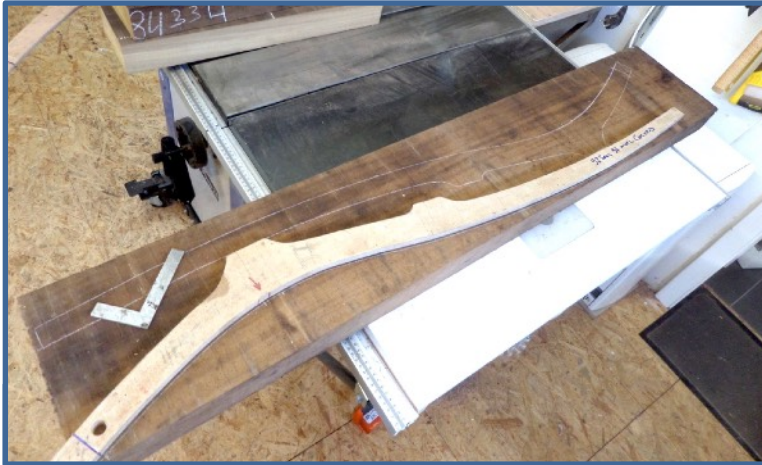
My preference, concave seat, hollow armrest, located lower on the seat, inclined front foot, 4° rear post.



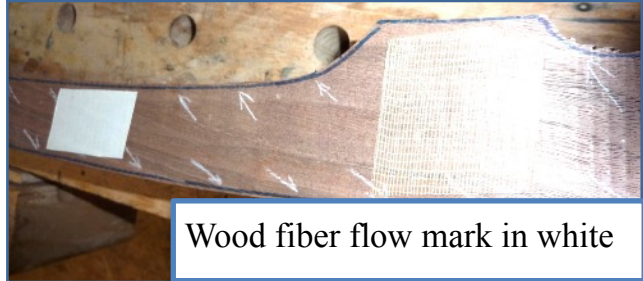
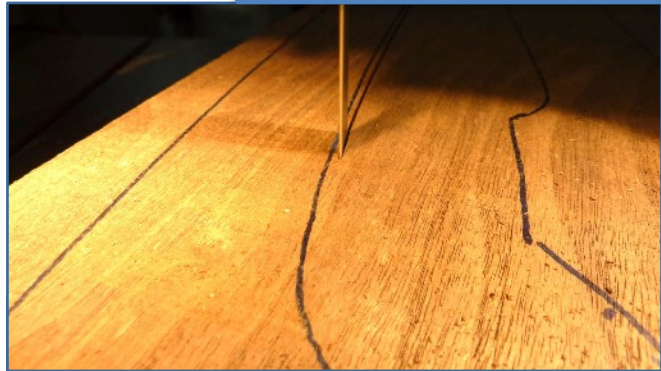
Original early Sam Maloof : flat seat, straight armrest high fixed, 5° rear post, fine rocker. Pictures from internet public site.



5) REAR POST MAKING OF :



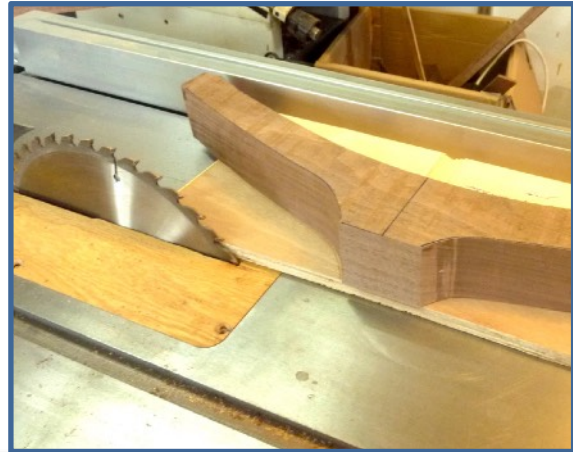
After plotting the plank is bandsawed 1 mm from the line. Wood fiber direction are marked. The guide is fixed and serves as a template for the shaper's roller bearing to copy precisely. Sometimes it is necessary to invert aside to respect the direction of the fibers with the shaper. Here a Big Daddy shaper by William NG



Wood fiber flow mark in white



The respect the fiber's direction of flow is essential not to loose the piece, if necessary invert on table to respect fiber, here bearing up.

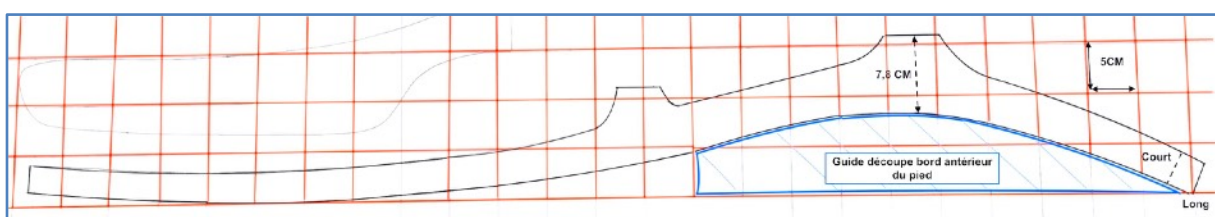


90 °cut of the anterior surface of the foot in preparation for making the tenon, 90° from seat.



The foot is rounded back with Planer No. 113 or similar, reduced to 37 mm in thickness with band saw , except at the reserve level of the headrest and seat.

The rear post is truly the pillar of the rocker, on the vertical axis of the center of gravity, seat empty or load. During assembly and adjustment it can be seen very quickly that there is almost no stress on the front foot, which tends to take off from the rocker rather than rely on it. The adjustment will respect the center of gravity of the seat by placing it slightly in front of the implantation of the rear foot, where all the weight of the structure will be exerted.



The making of the rear post must initially present reserves for the headrest , the armrests, the sculpture of the horns at the top, the sculpture with the seat and the sculpture of the connection to the rocker, at the bottom.

The rear post includes in its manufacture a multitude of round-trip assembly and disassembly to adjust the implementation of the headrest and armrests. Indeed there is not a single right angle at this level, and the markers are random, so the adjustment takes a lot of time.

It is a large piece that will be carved in all junction areas. This sculpture is a big part of the charm of this seat. It will be easy at the seat, and the armrest. But at the level of the head rest and horns it will be very meticulous and symmetrical.

The technical times are mentioned in the previous images:

a) Cutting.

b) The tenon to the mortise seat.

c) The sculpture.

- The sculpture of the junction with the seat

- The sculpture and the realization of the junction with the armrest.

- The sculpture and the realization of the headrest

d) finishing the foot and rounding before gluing very late.

Wood cutting and delign :

The rear post is symmetrical, on a piece at least 55 mm thick, the transverse dimension will be an average of 37 mm, the difference will be used for rounding. It is easier to start from a thickness of 64 or 65 mm, to make beautiful roundings, or it is possible to stick two pieces in over-thickness of 1 to 1.5 cm at the level of the headrest and the mortise like Hal Taylor, to compensate a little weak supply in thickness.

The quality of the wood must be absolutely perfect to pull two post almost symmetrical, it will be seen at the end when the wood figures will be harmonious face. Again, avoid the sapwood. The best walnut board is at least 1.35m by 24cm wide. With two templates we choose the best cut.

(One must be aware of the slightest crack, and nodes spread on both sides of the plank. The cut can release stresses in the wood and be revealed by a crack the next day..)

The band saw path is done first approximately 2 mm from the drawing of the template. Then the cut on the wood must then be refined to the exact template. This work must be done with very good cutting tools, with shaper or router. But it's a 55 mm thick piece of wood..

The wood fiber is a considerable obstacle in the shaping of the rear foot with aggressive shaping device, because they can stuck in very hardly and destroy the piece of wood . So it's necessary to spend time to locate the flow of wood fiber with a white pencil, indicating the fiber flow arrows above and below. The porpoise is to keep always the direction of tools rotation following the wood, making sure that the cutting tools follow the wood fiber flow and do not upset them. Overall it is necessary to mark the limits of inversion of the direction of the fibers, because it is at this point where the rotating tool can stuck.

So the template work now as a guide to ball bearing device, it's then carefully fixed with double-sided sticky adhesive, inside the cut, leaving the few millimeters to be remove. On this guide the roller bearing of the milling cutters will run and this device will clean the foot perfectly following the template, either from above or from below depending on the position of the bearing on the shaper or router bit, which must have at least 60 mm high. But these techniques had to deal with variations in the direction of the wood grain.

When the fibers are reversed (the area is well marked), it is necessary to change mills with another device with ball bearing in the other position or to turn the piece, to keep the guidance of the wood on the bearing. It is therefore overall important that the milling is done in the direction of wood fibers.

Then an oscillating sander of 30mm diameter connect well the junction zones, with a fast movement avoiding to stop.

The posterior curvature of the post is fixed with the Stanley 113 curved plane, or either method.

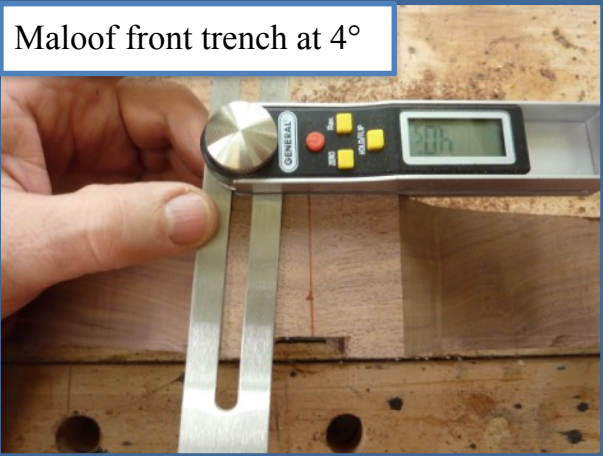
The rear post can now to be prepared for the making his tail, some pictures :



The piece is decreased to 37 mm thick by removing about 15 mm inside with the bandsaw, and leaving reserves for the seat tenon, the headrest (20 cm), and at the bottom the junction with the rocker.

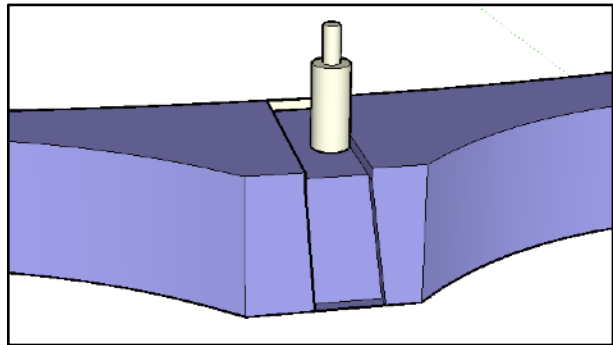
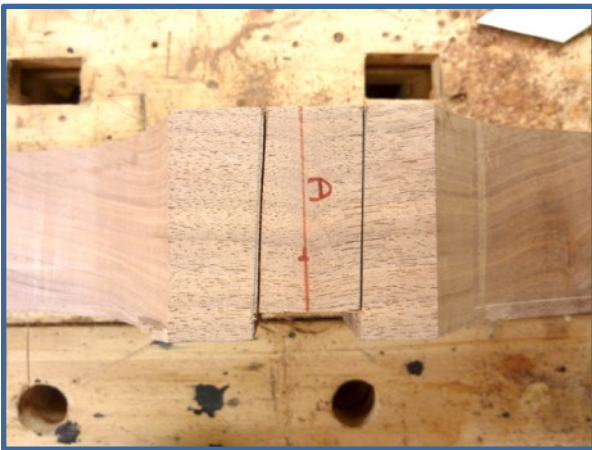
The inner surface must be refined plane with card scraper, the Stanley 80 scraping plane, or either method.

Rounding the post is finalized, here with French Lioger or Auriou, 9 and 11 chair rasps.



Maloof front trench at 4°

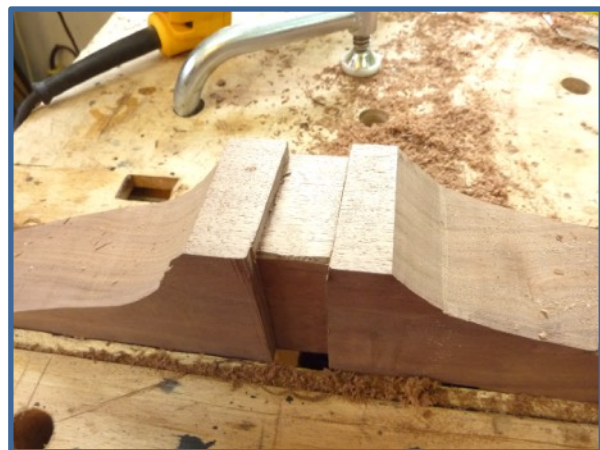
We start with an internal trench, 90 ° from the anterior facet, taking the height of the corresponding mortise of the seat. The anterior trench is then made at 4 ° in Maloof technique, or at 90 ° in Hal Taylor (see below).



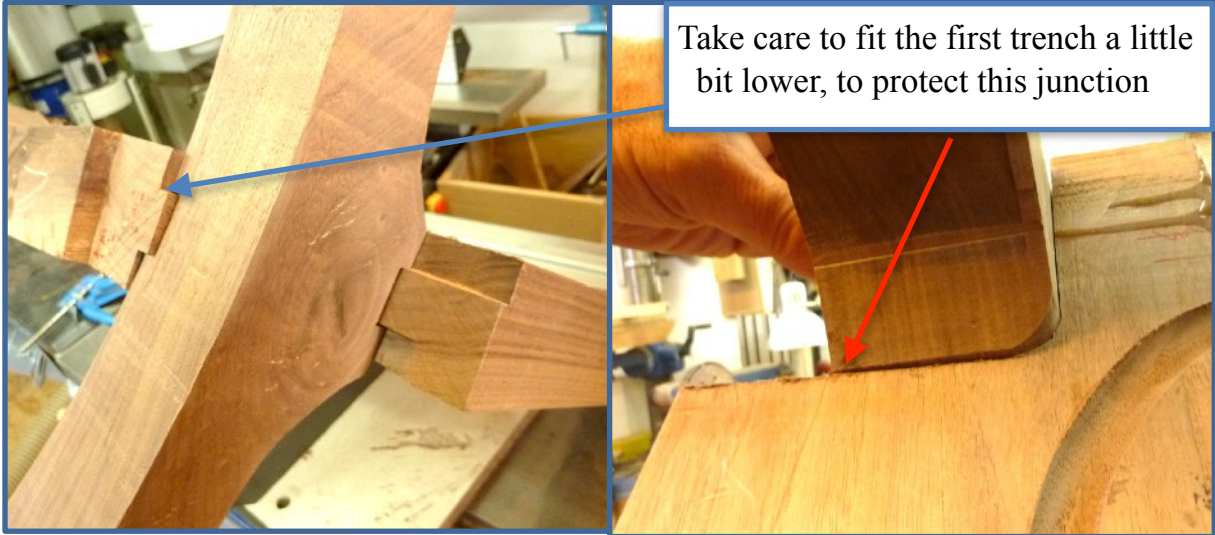
Two stages Sam Maloof



6,36 mm

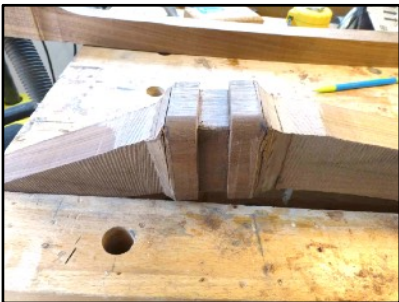
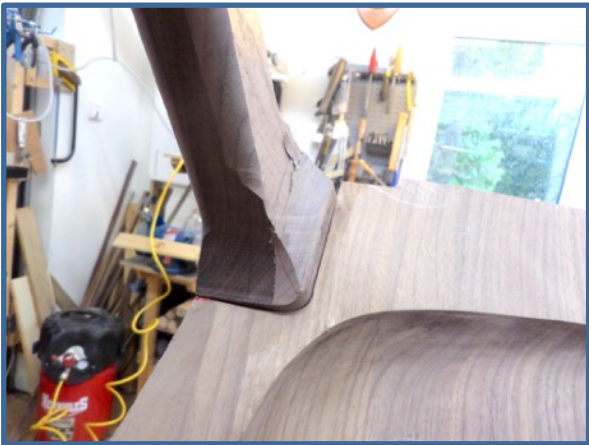


I saw with a little inclination to the kerf, to reproduce the slope of the nesting. Two screws are located at 45 mm from each other, taking into account the posterior rounding to come.

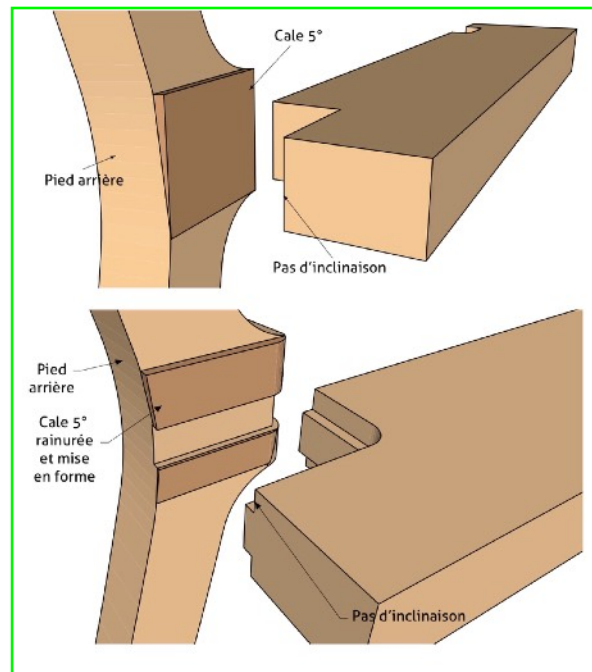
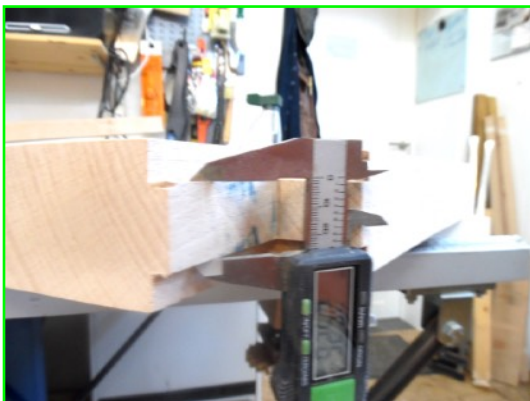
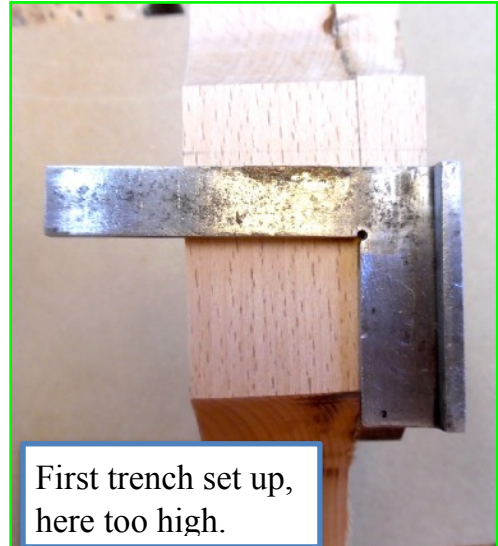


Take care to fit the first trench a little bit lower, to protect this junction

Reduction test. The outer edge of the No. 1 piece of seat has not yet been resected. The slope is good, very flush for the sculpture.

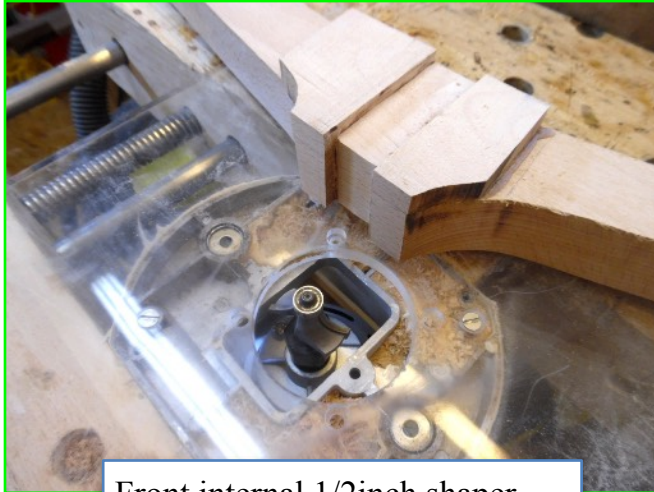


Lateral side seat can be resected, shaping can start, here Auriou chair rasp.



Alternative Hal Taylor

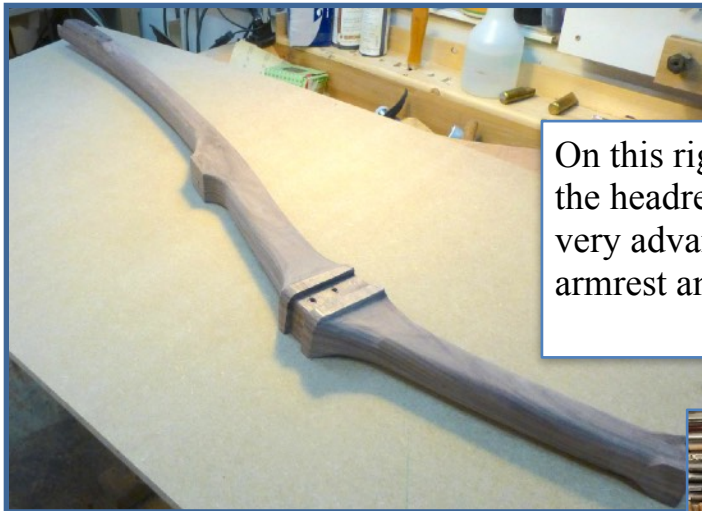




Front internal 1/2inch shaper.



Hal Taylor technique final result:
The added 4° wood piece is almost invisible



On this right rear post the gutter of the headrest is made, the post is very advanced, the site of the armrest and rocker are fitted.

The piece above is well advanced in the sculpture.
But most American and Canadian authors glued the four legs early and then sculpt, like Mike Johnson on this cliché he publishes on Facebook, or also Hal Taylor, Scott Morrison, William Ng ..



Mike Johnson picture

Making rear post tail :

The cutting of the anterior facet of the implantation is done on a dedicated guide, with the table saw. With 8 cm in size from front to back it is possible to carve back a beautiful rounded back.

There is therefore a trench on the anterior facet of the back foot at 4 ° of the facet corresponding to the mortise of the seat. One always begins with the internal trench. It determines the beginning of the anterior trench, which must be at 4 ° for me.

It is then possible to make the tail to the image of the exact dimensions of the mortise of the seat, by not omitting to put an inclination of 4 to 5 ° to the front trench.

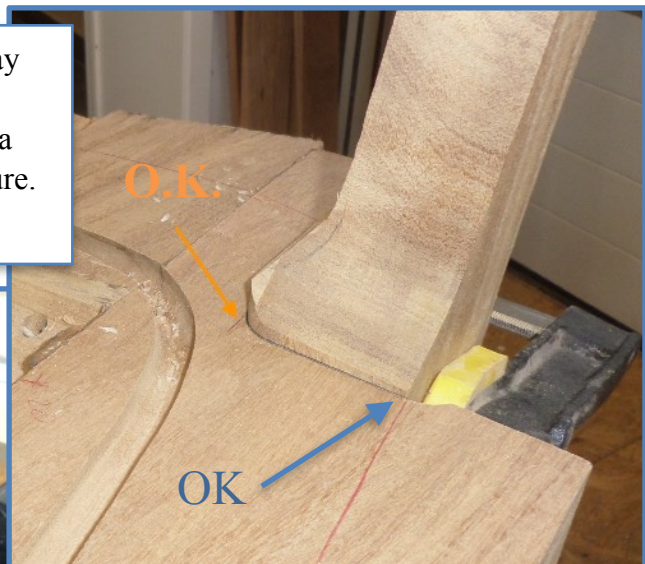
I make these trenches with the router in two passes, after a definition of the edges with the Veritas tenon saw.

With Sam Maloof's original double mortise technique, a 4 ° slope must be incorporated on the anterior facet of the rear post.

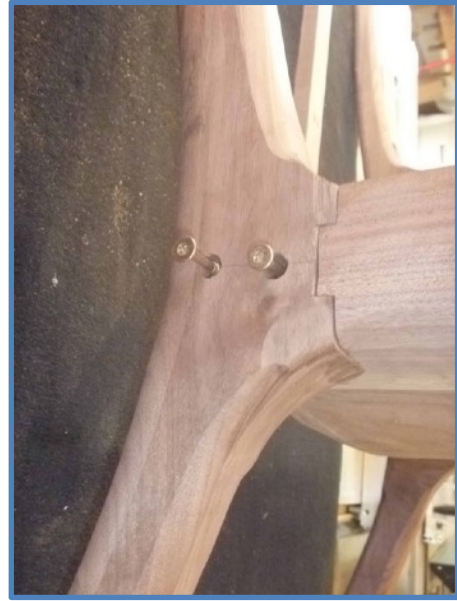
In the Hal Taylor technique where a 1.5 cm piece has been placed on the inner side already at 4 °, it is sufficient to make all the trench all at 90 °.

It will be necessary to be careful to position the trench so as to have on the surface, of sufficient height regarding the plane of the seat.. It is therefore necessary to descend the medial trench accordingly of a few millimeters on the foot, after a trial presentation.

Reduction test. The inner edge of the tray has not yet been removed. Warning, At the outer edge of the rear post avoid a stair step. Inside good aspect for sculpture.



The two screws are positioned at 45 mm from each other, taking into account the roundness of the postero-external edge shape with a router.



Above Torx screws, in 3/8 superficial holes.

Left :The post was reduced to 37 mm thick leaving reserves for the head and tail part, and the sculpture with the rocker. The roundness of the post is very advanced.

SCULPTURE OF THE REAR POST

- It is then necessary to decrease to 37 mm of thickness the rear post, down towards the rocker at the top towards the headrest, keeping at the level of the implantation a zone of g which will be carved.

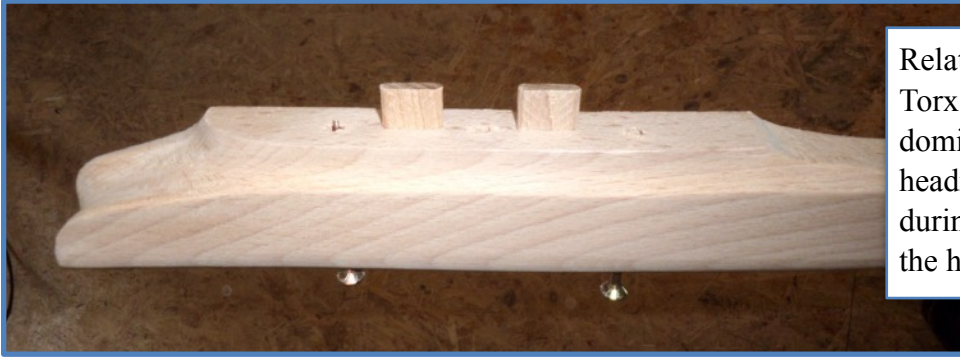
- The piece is then worked with card scraper, curved plane 113 and the Stanley 80 wood scraper.

At the top we think about the implantation of the headrest and we leave about 20 cm free.

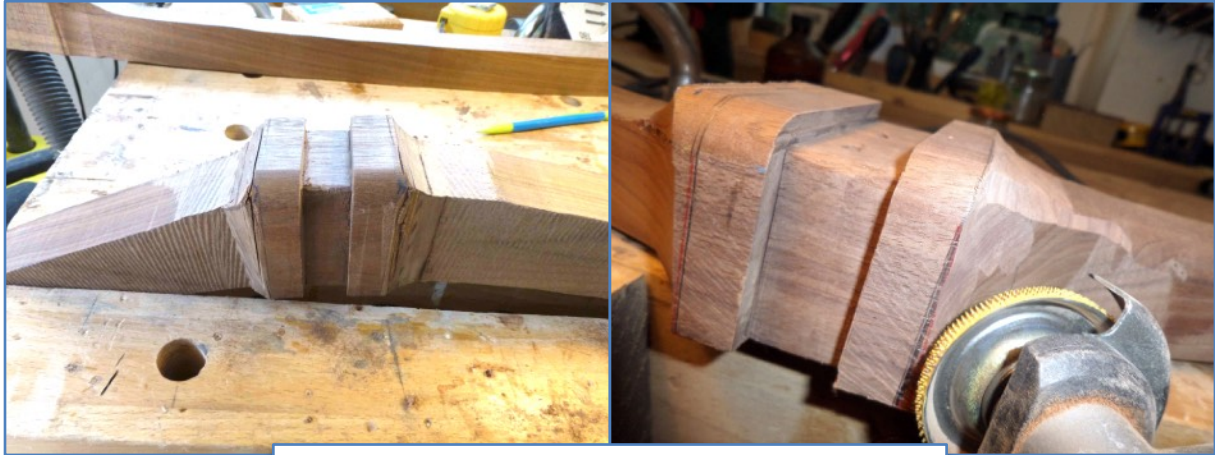
Two areas are critical then, the layout of the armrest forward and the headrest at the top.

It is then necessary to carve more and more this seat on its rear post and the seat, after provisionally fixing the headrest.

So despite this plan of manufacturing that is methodical, it will have been necessary to begin before the other parts of the seat, and especially here the headrest.



Relationship of the 3 Torx screws and dominoes with the headrest to be provided during the making of the headrest.

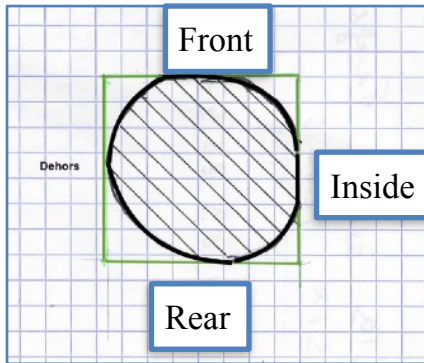


Rear post sculpture around tail regarding the seat.



4° bending guide for drilling

A drilling guide with a 10 mm barrel bending by 4 ° allows to make a dowel hole of 10 mm which will unite the rear post to the rocker. Thus, although the foot is flared outside about 4 °, its dowel will be vertical on the rocker.



The sculpture of the rear post is done as for the front foot in the same way, towards a beautiful round.

This sculpture is partial and will not be completed until the armrest and headrest are completed and glued. The four edges of the 37 mm post will be rounded to the 1/2 inch router anywhere, but with a 1 inch radius cutter out and back.

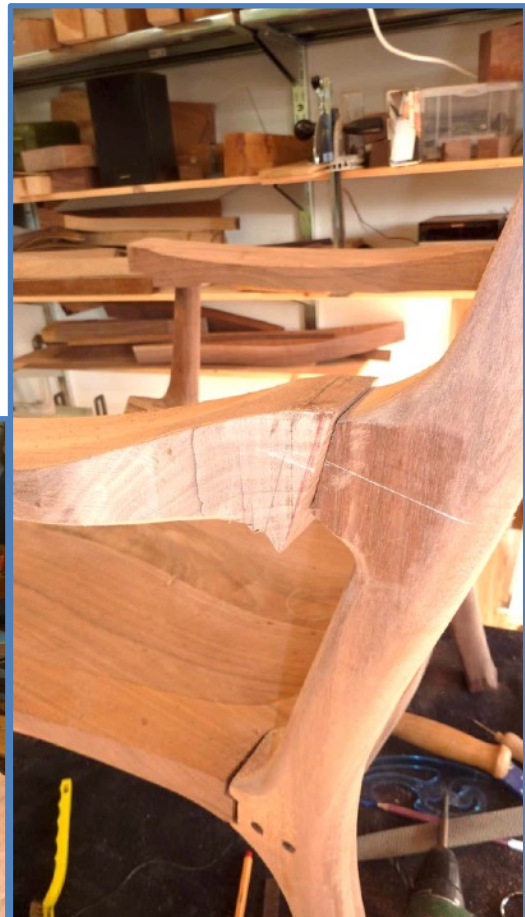


Under : the sculpture and the realization of the junction with the armrest :

This time is only possible when the armrest is very advanced, I will talk about it later.

It's better to finish the headrest and implant the dorsal slats before launching into the armrest.

So the armrest front and rear implantation references will well be fixed in space.



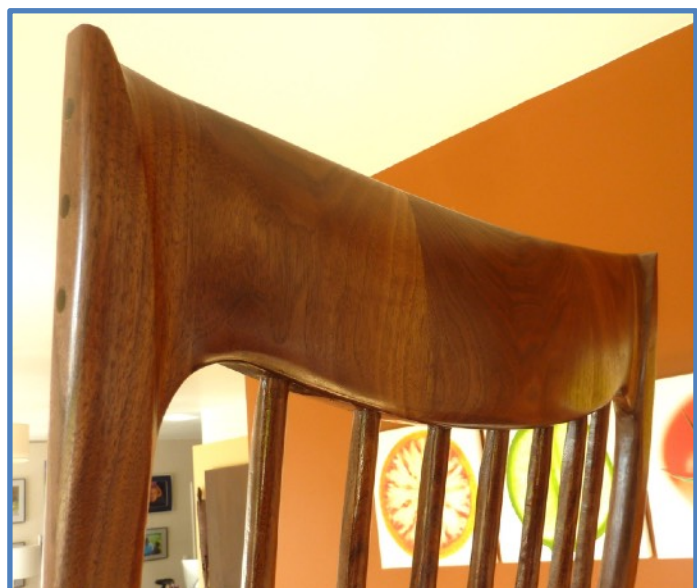
6) Making and adjusting the headrest :



It's time to fix the 4 feet on the seat and check the symmetry. Symmetry is naturally of overall importance at this stage. The making of the headrest must start and the rear foot is far from being finished. Especially because the sculpture of its junction with the headrest include a harmonic gutter backward possibly extended upward by two elegant "horns", which are really part of the style.

Forward the front face of the headrest is gently concave and extends on the rear post.

The posterior face is curved in all directions, and is connected to the upper edge, by a harmonious curve. At the bottom a sinuosity sees the thickness to increase in tear drop, where the 7 holes of 12 mm slats will become established. Finally a rounded shape joins on the sides, the rearpost and the headrest.



The headrest can be done in two ways, either with a perfectly orthogonal cross-piece 52 X 17 X 6 CM with transverse fiber, or by 3 coordinated vertical fiber parts, assembled with a slight concavity, as in the following pictures. At this level, it is good to have beautiful aesthetic fibers taking up the curve that the eye wants to follow. The preservation of a rustic knot can be used.

The technical times must respect this very tedious and boring chronology whose following pictures describe the path :

- Symmetry is a permanent goal. Place the piece between the two rear posts and choose the good cutting line, for the table saw, reproducing the inclination of the rear posts right and left in symmetry.

- Fix headrest profile , setting up 3 screws and two dominoes or lamellos to fix the position and continue the shaping. The flat anterior surface is slightly in front of the plane of the rear post. The flat posterior face protrudes far behind, it will be carved. There are no template, even if you can later make one with your own drawing, according to existant picture.

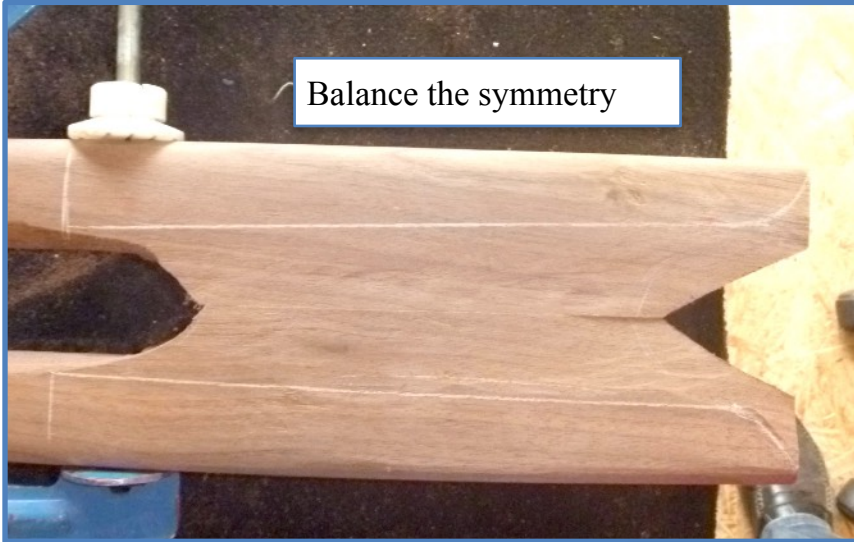
- Draw the upper and lower edges using an architect's rule, previously used for the seat. On the underside face put 7 equidistant markers, future implantation for slats.

- Using a flexible blade or rule, draw the roundness of the anterior face on the inferior face, which will be sawed after the slat holes have been drilled.. The holes of the slats to be implanted must be parallel to this curve which is drawn, at the inferior face of the piece.

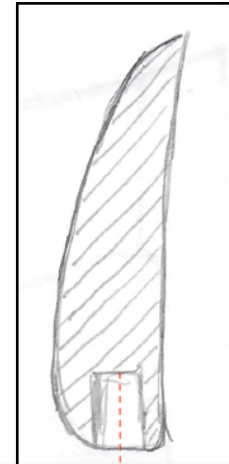
- Identification of future drilling paths of the dorsal slats from bottom to top. It is time to make the corresponding slat holes in the seat, if this has not been done (see this chapter). As a reminder it is a line halfway, rounded parallel to the posterior edge of the seat digging. 7 holes are placed equidistant, deep 20 mm, diameter 12 mm. From the headrest by setting back, we make an eyeballed line with a straight rod of 80 cm of the future path of the slat.

- This rod gives the lateral inclination of the holes, which will also be given in the headrest. We will drill respecting this inclination. The upper holes of the slats are drilled either on the drill press column or ball-eyed respecting the inclination of the path, and the rounding of the front face of the headrest. The upper edge of the headrest block still flat, and not yet saw, gives perfect stability to drilling. A rough block gives the inclination on the drill press table.

- Bandsaw the front face of the headrest, under control of the holes of the slats clearly visible.



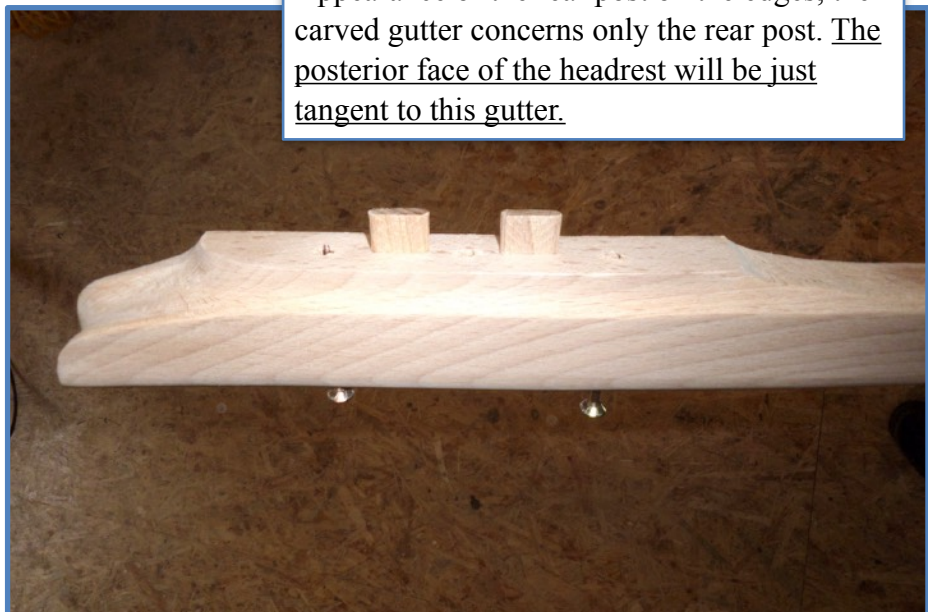
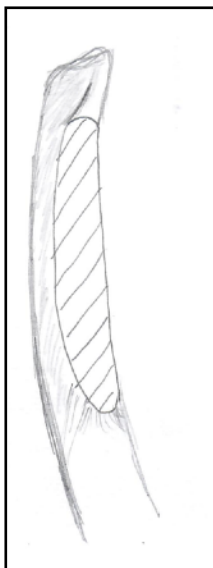
Balance the symmetry



Cut in the middle of the headrest. The anterior surface is concave in all directions. The posterior face in « teardrop".



Appearance of the rear post on the edges, the carved gutter concerns only the rear post. The posterior face of the headrest will be just tangent to this gutter.



- Cutting the upper edge of the band saw
- Cutting the lower edge of the band saw, these two cuts are very late. Drilling slat hole can be extended in deepness if necessary.
- The well-shaped headrest is re-attached by screws to the two rear posts, and the final sculpture can start on this block.
- Sculpture with the grinder of the anterior face with ample and measured gestures. It starts at 80 grain up to 180. The front face must be concave forward and simply connect flat just to the front edge of the rear posts. The upper edge has a sharp edge. The lower edge is carved in round teardrop the lower edges will be refined later
- Sculpture of the posterior face, curved, thickening up and down. On the side we find simply the gutter of the posterior edges of the rear posts.
- Fine carving of gutters and horns on the dismantled piece at the workbench.

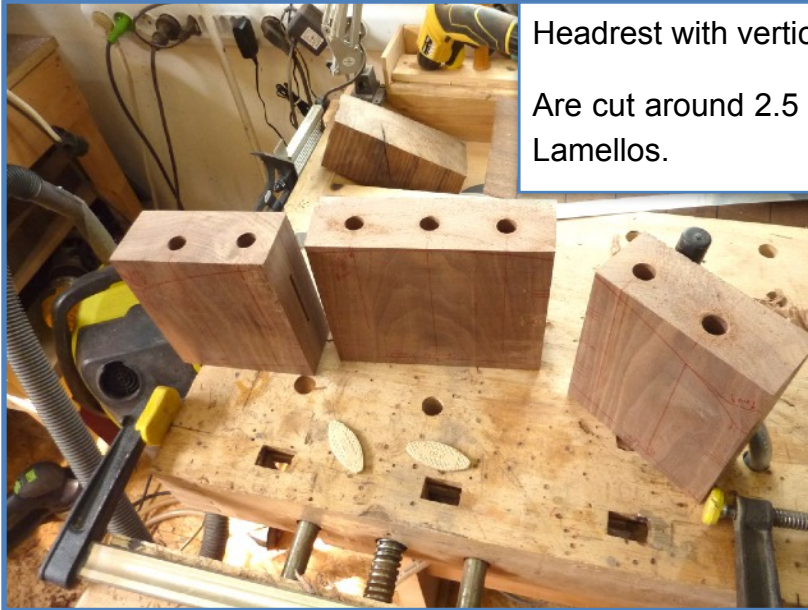
- I prefer to work the pieces at the workbench than on a glued piece fixed on a heavy piece of furniture.



Draw a rounded upper edge with a metal ruler.

Small nails serve as a reference for corners and edges.



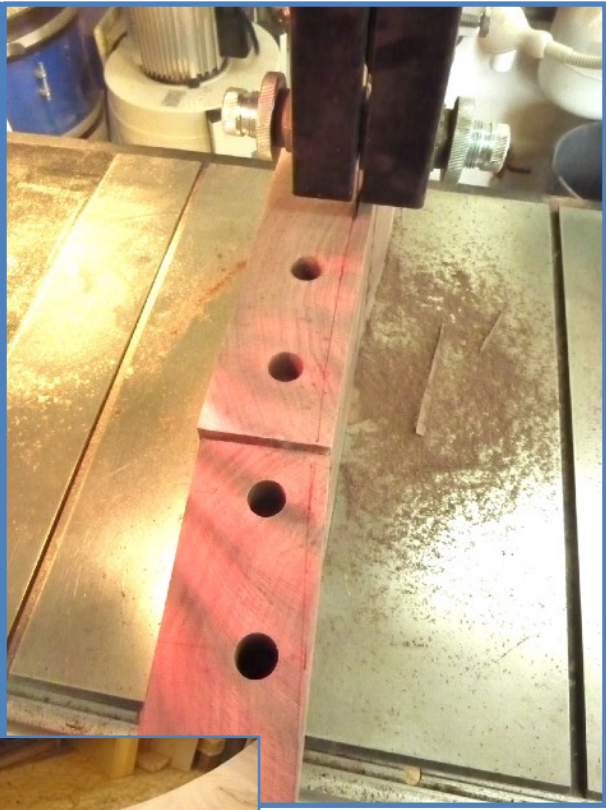
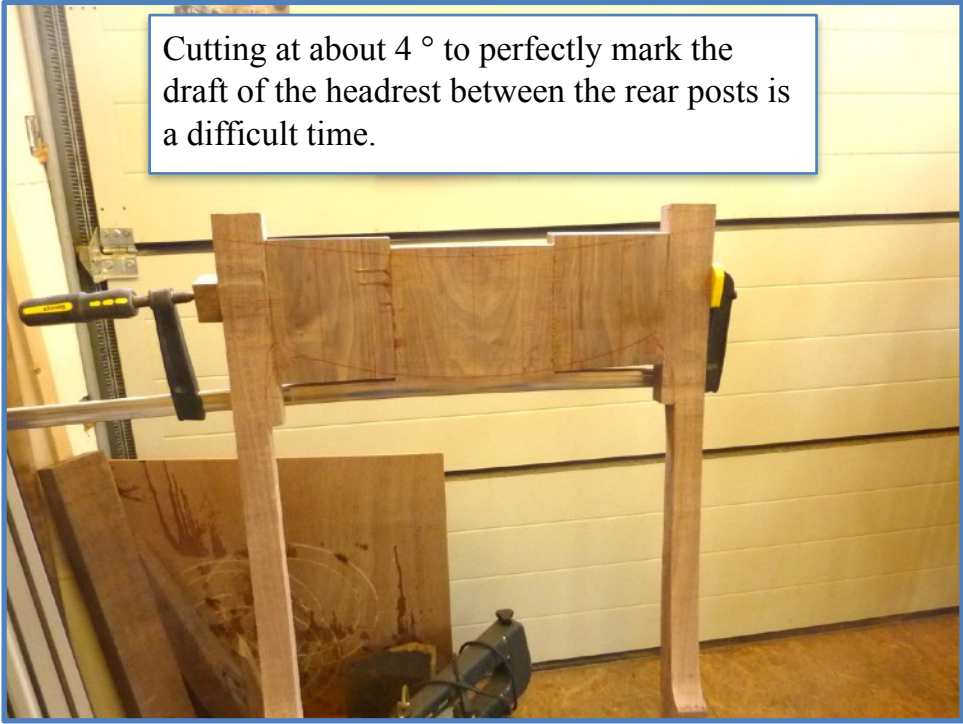


Headrest with vertical fibers. The three pieces
Are cut around 2.5 ° to be fixed in concavity by
Lamellos.

Three vertical blocks,
are an alternative. The
trouble is that the side
must be shape
parallel on table saw
after gluing.



Cutting at about 4 ° to perfectly mark the draft of the headrest between the rear posts is a difficult time.



Picture of rear post reserve



The holes of the posterior slats in the headrest must be drilled:

- before cutting the upper and lower edges.
- after cutting the front panel.





The sculpture of the gutters in the rear posts must be done first in symmetry, on the workbench, (it is assembled temporarily). Then comes the connection time of the gutter with the posterior face of the headrest.



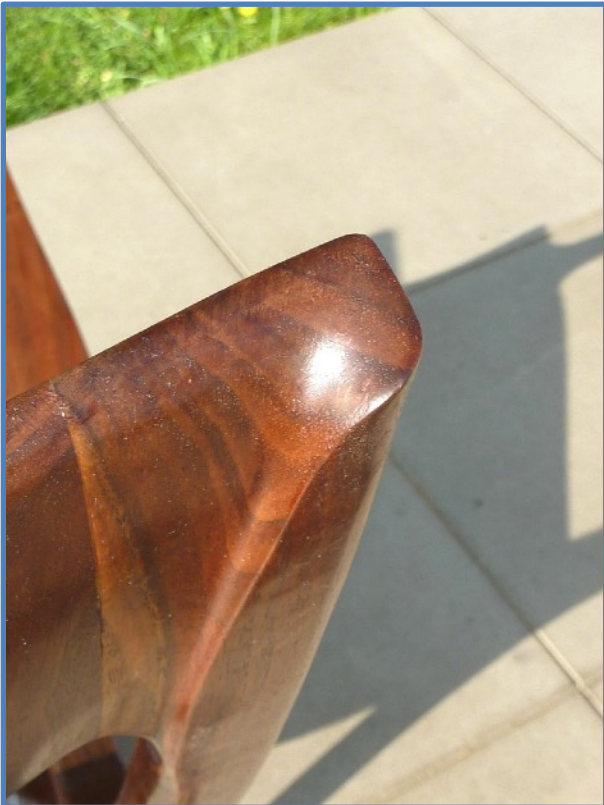


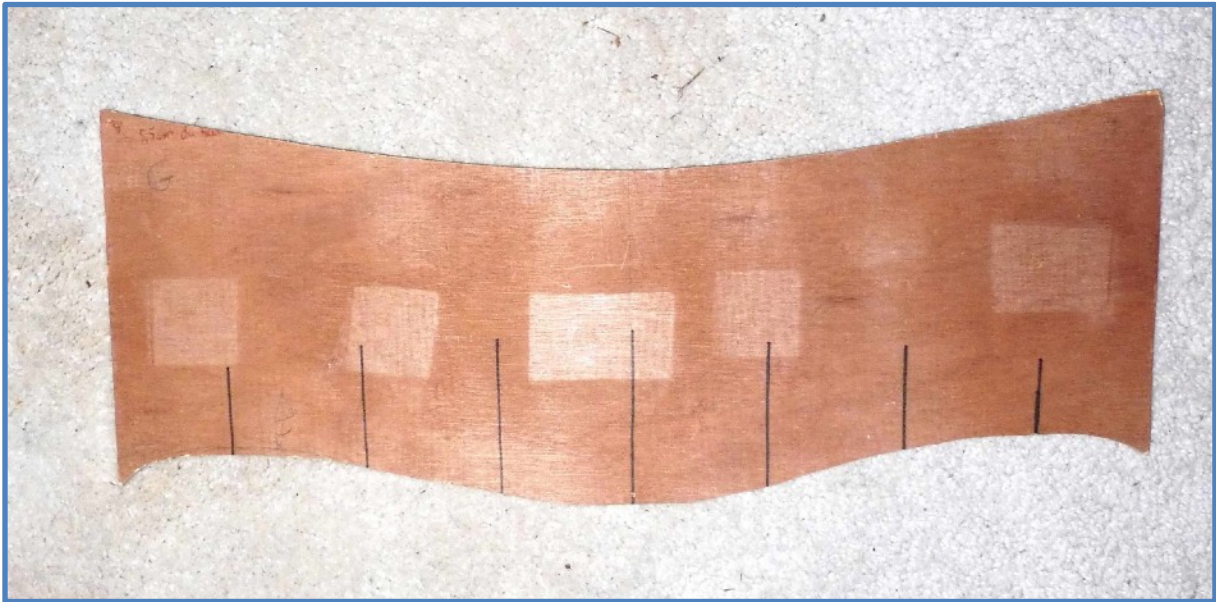
The gutter only concerns the rear posts the rear face of the headrest is simply connected smoothly.

The posterior crest was sometimes connected to the armrest, internal crest all the way of the post by Sam Maloof.

This is particularly difficult, as this requires a clean long reserve down to the armrest internal side.







A simple template made with graphic designer rules; it can be made differently according to taste.

The markers line give the direction to be drilled for the holes of the dorsal slats. The inclination (theoretical) is indicated, but in reality it is necessary to postpone them as they are really presented.



Implantation of the 7 holes of the seat. A precise sketch is pierced superficially.

Then, for oblique implantation, I pierce freehand by placing myself behind and at the top of headrest, ball eye direction, and looking down, to find the right direction be drilled.

This time is quite artisanal.

The goal is to have divergent dorsal slats penetrating up and down without difficulty.

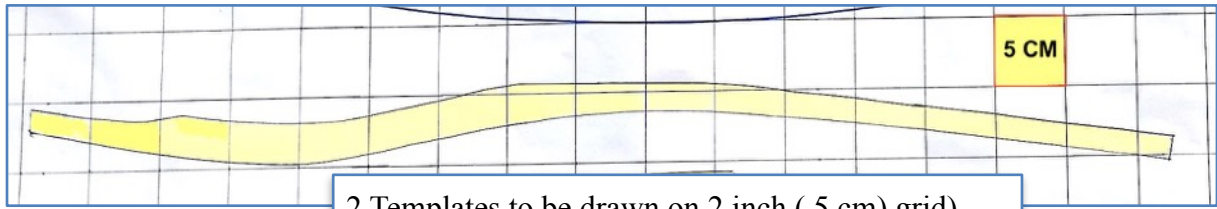
From these holes the direction of the holes of the head support are easily traced as in previous images.

7) Making and adjusting the dorsal slats :

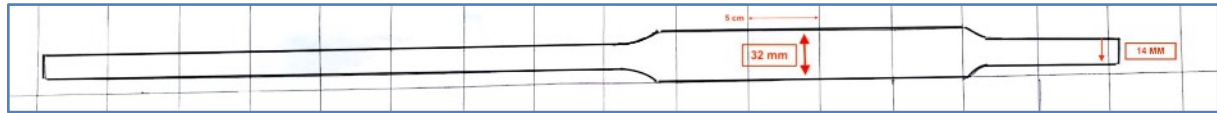
Sam Maloof design a fully anatomical rocker, comfortable to sit in and easy to get out. Slats participate fully in the comfort of the seat. They reproduce the anatomy of the dorsal and lumbar spine. They perfectly fit the back, from top to bottom and transversely. They fit the center of gravity of the body at the center of gravity of the seat, under the center of rotation of the rockers. (the center of gravity of the human body is in front of the 2nd sacral vertebra, in the pelvis).



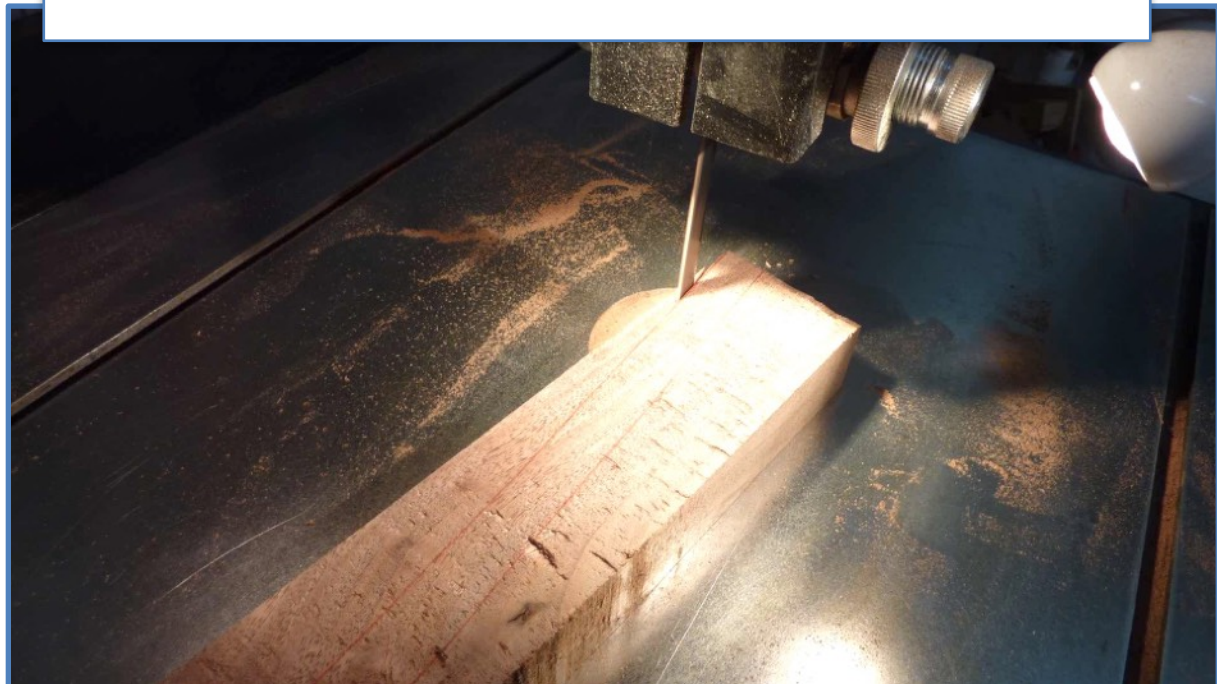
Physiology of a rocking chair,
Orthopaedic point of vue



2 Templates to be drawn on 2 inch (5 cm) grid.



Drawn first of 7 pieces, trying to keep the wood grain from right to left in harmony.



The slats are delimited in a block of 80 X 3,2 X 5.5 cm. First in the direction of the first template, then in the frontal plane with the second template. Then they will be carved.

A) MAKING OF SCULPTURED SLATS, CHRONOLOGY :

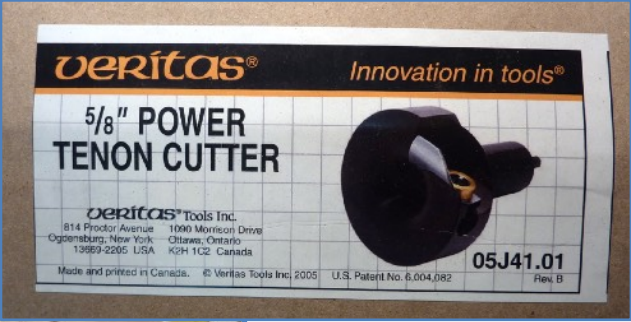
There are two methods of making slats, either traditional in the style of Sam Maloof, which requires a lot of sculptural work, or laminated with the same profile but easier to do. Beforehand it is necessary to make the template on plywood of 5 mm, which allows to draw the profiles on perfectly square boards.

- 7 blocks of 80 X 3,2 X 5,5 cm of the same contiguous origin, are band sawed and numbered in a harmonious way, in order to match the wood grain from right to left.
- The first template allows you to trace the cut for the band saw.
- The second draw on the front side, allows the second cutting with band saw.
- The anterior surface is carefully regularized with the plane.
- The posterior edge is rounded with à 10 or 12mm (3/8 or 1/2 router) bit.
- A sculpture makes the transitions. The anterior surface is flat in the curvature.
- The ends are rounded in tenon. I use a very practical VERITAS accessory in 5/8 of an inch corresponding to an equivalent hole at the top and bottom, after having tested several other solutions at 1/2 inch.

The slat must go up and down with soft friction, they will be glued later in the final stage. This maneuver requires many round trips. The shape comme naturally in your hand.



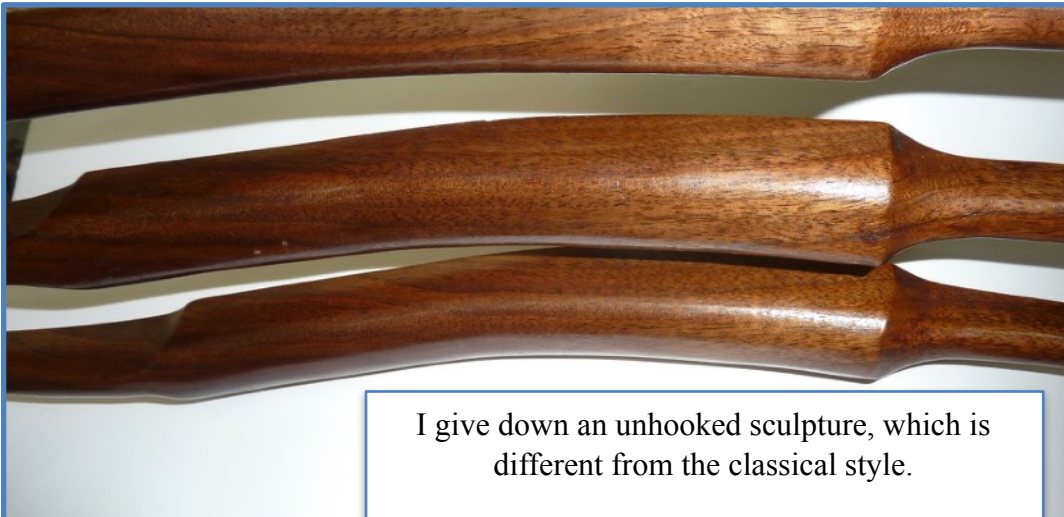
Second template also slightly band sawed, before sculpture.



Each slat are refined and must fit up and down. Wood grain with « rifle butt » quality, can increase the aesthetic effect.



Round router bit, used with care allow a regular work on all slats and decreases the work of sculpture.



I give down an unhooked sculpture, which is different from the classical style.

B) MAKING OF LAMINATED SLATS - CHRONOLOGY

The realization of laminated slats is much easier than that of carved slats. They have a comfort quite equivalent. They can be 6 in being wider, about 37 mm, while the carved slats are still 7 in number and 32 mm wide. The previous guides are identical.

They are made by assembling 2 slats of 5 mm thick, they are then flexible which is an element of additional comfort. In this case their nesting is also simpler, being reduced to a slot at the top and bottom of 10 mm. In this case I stick them down in the seat, but I leave them free up in the headrest.

It is also possible to make them in three layers, possibly with a different color essence (ash in walnut for example, or wenge in beech). In this case it is possible to make a tenon of 12 to 14 mm and it is necessary to stick them up and down, like the carved slats.

The laminated slats are made on a fir mold to be made beforehand, with the same frontal guide described above, drawing the anatomy of the back. This block of fir 80X5 CM is then stripped with band saw, and coated with a layer of gray tape.

This support is stuck on the bench press to shape the slats, while sticking them with white glue. This slats are made of strips of 80 x 3.7 x 0.5 cm, made by band saw or table saw. I leave them 24 hours in collage in press, and I do them one after the other.

From the aesthetic point of view, it is good to identify adjacent slats to spread them first in front in a matching aspect, the continuity of the wood grain is then pleasant to look at. It is possible to carve them by refining them up and down.



The first template is use to draw on a pine fir the front anatomy of slat.



8) EVOLUTION :

At this stage the seat is very advanced, thanks to the screws the 4 feet are integral with the seat, the headrest is secured to the rear post and the 7 slats are placed and wedged between the headrest and the seat.

The seat becomes heavy and bulky, it must be handled with care.

We must not stick anything yet on my point of vue. It is necessary to realize the making and the installation of the armrests on these marks: in front the trunnion of the front foot, and behind the connecting surface of the rear post

This order of manufacture will also be the order of gluing and the armrests will thus be fixed last. The two rockers making of must also started.

Only then, will the seat be connected, balanced and glued to the rockers.



9) Making and adjusting the armrests :

The armrests are made in 3 steps: the roughing, implantation of the piece on the front foot and the rear post, then the actual sculpture in perfect symmetry.

Personally in my aesthetics, I make rounded armrests to present themselves to the elbow in a harmonious way, this is the technique that I describe here. I also implant them slightly lower on the seat, at the level of the front foot.

However in the original model of Sam Maloof, the armrest is flat and implanted higher, as on these original images of his workshop with a flat seat. This is naturally easier to do (snapshots of Sam Maloof book and Mike Johnson 2018).



SAM MALOOF

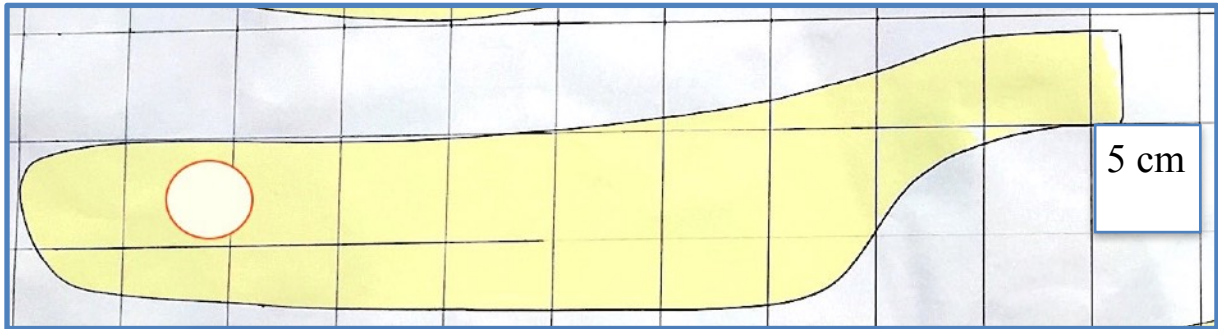


MIKE JOHNSON



I shape armrest on this way

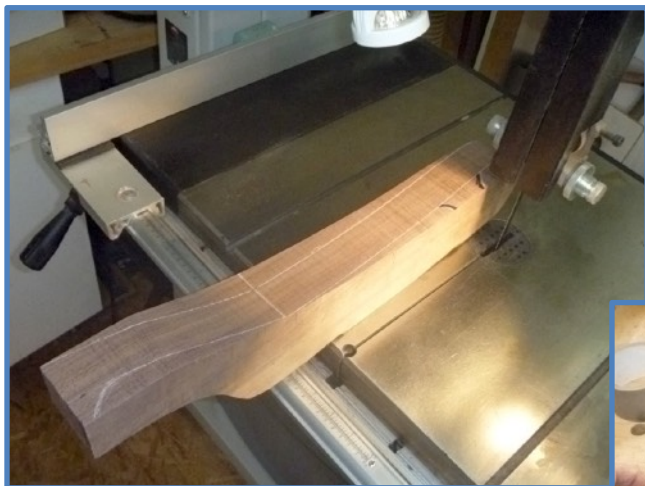
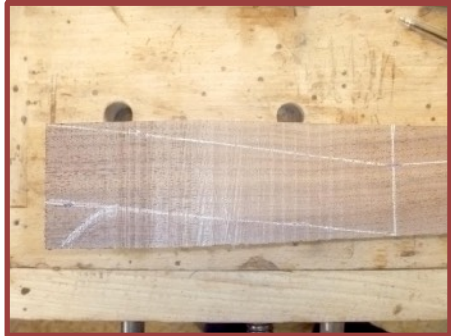
I use 8mm Dominos to reinforce rear junction with posts.



Template to be done for both side of armrest.



Choosing junction site.

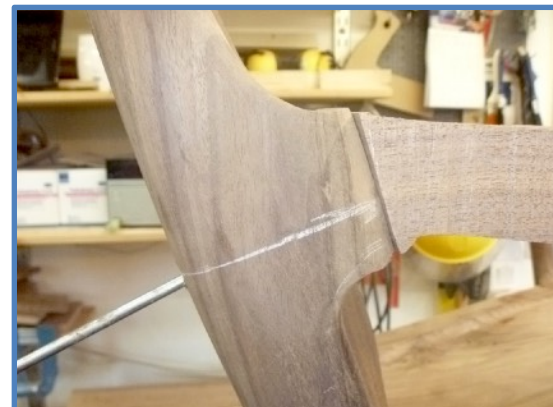
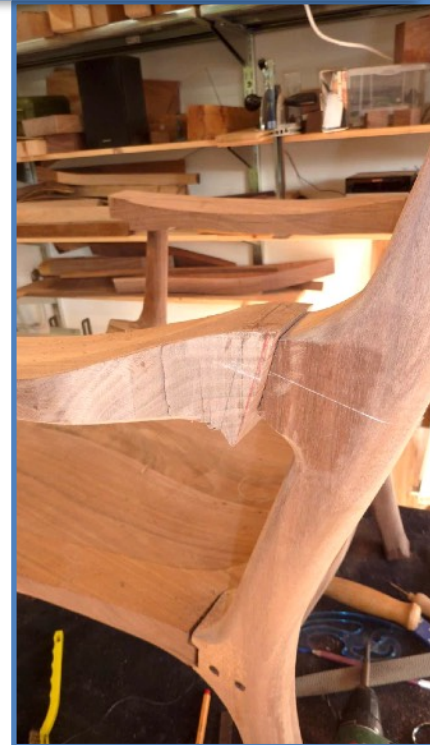


The hollow is traced to the posterior third, on a perfectly square block 5.5 to 6 cm thick. The cut pieces are fixed, with gray tape, to maintain stability on the bandsaw.





The angle of rear junction, is first cut by approximation (bull eyed). The front dowel hole is marked with a 10mm pointed copper marker placed on the front foot hole.



The junction angle with the armrest is done by successive approximation. Once the front dowel is set, this area is thinned and adjusted gradually.

With the front dowel in place , a screw is placed inside a 3/8 head hole.

A Domino is fitted after flattening the innerface of the junction, on a pencil line, inside or outside the screw, using the two flatten regarding surface.



Laying dominoes : Screw in place tight, the internal face is flattened, a line in pencil is drawn, after dismantling a domino 20x8X40 mm, is done, making the mortise on each separate piece as usual.



The 2 parts go outside for sculpture with 2 grinders, always in symmetry and with some boldness. Armrest is resected above, then underneath with harmonious rounded as shown. Then the sculpture continues on the workbench.



Left armrest outside. We resect below the white line.



Left side inside. We resect above the line. Front foot junction is created.



Right armrest, seen from inside. We resect above the line. On the workbench, round the surface with the edges smoothly.

Simple beech flat armrests, fixed on a mini bench, outside.

The job is done in symmetry, resecting with grinder roughly the same quantity of wood

Both side are shaped simultaneously .

Final sculpture is done then on the workbench.



The both parts reassembled and carved on a workbench. The shaping goes farther and farther, towards 180 in sanding grain. You have to dismantle the seat every time, for details. The more the seat progresses, the more we will seek to refine the finish being opportunist on a detail, as it come to look.



Sculpture of the the front foot junction. As I turn the front foot eccentricly, there is a relative inclination of 3 °.

It is necessary to put in the drilling of the dowel hole in the armrest, this slight inclination.



Finished walnut armrests , sanded to 180, ready to be glued.

After gluing the entire seat, it will be sanded to 240 grit.

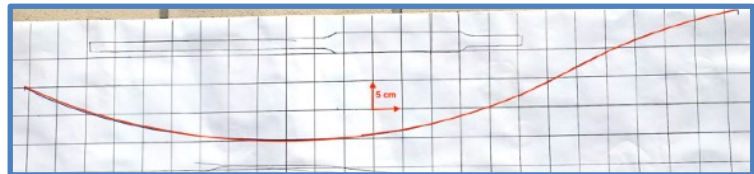




10) Making the rockers :

The manufacturing mold of the rocker is made on a block of fir 130 X 30 X 5 or 6 cm. The reproduction of the template is glued on this plank and edged with a band saw. By adding a ski below it's possible to secure, this heavy device on the workbench press.

Regularly distributed holes allow to slide the clamps. Laterally guides prevent sliding slats during gluing. The width of the required slats is 40 mm. after gluing it will be reduced by shaping around 37 mm. Thus the space between the lateral compression guides is about 42 to 43 mm.



The goal . Here walnut and ash insert



The rocker's curve is a circle segment of about 1 m radius.

The length varies between 1.20 m and 1.35 m, it depends on its taste.



Gluing is a little tricky.

Lateral aluminium guides can be put in compression, to avoid a lateral sliding of the slats.

Compression is done from the center to the ends.

The long batten are cut on the tablesaw to 5 mm thick, 40 mm wide and at the desired length. A magnetic pad give the thickness outside à thin blade. A total of 14 battens plus two, to make the addition height under feet , and 2 for the contrasting batten are made. It is a very tedious time producing a lot of sawdust for 18 slats. The use of a narrow blade on the table saw reduces the loss in thickness. The table saw allows for a great consistency of thickness, the band saw is an alternative but it is difficult to adjust for me.

So on each rocker there are 7 main battens in the sequence, from top to bottom: (2 +1 in contrast + 4). But under the front foot and the back foot, we will put two battens of 10 and 12 cm long, secondarily, with the sequence from top to bottom: (2 + 1 in contrast + 1). It's good to choose the two most figured and symmetrical batten on the rocker's top.

The slats are glued with Titebond 3 and put into compression starting from the middle to the ends, using a large amount of clamps. The compression is maintained 24 hours, for each rocker.

The rockers will then be sanded outside, to remove the excess glue, or passed to the planer. I flatten the edge personally with my grinder and a 120 grain disk. The additional batten of 4 thicknesses are added after and will be carved in rounded, and drilled at 10 mm for the foot dowel.

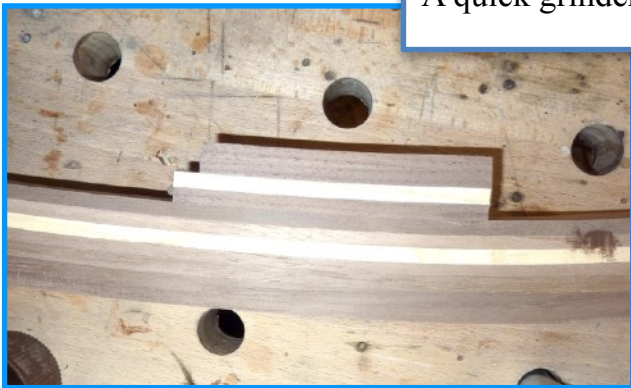




A pile 10 cm long under the front foot and 12 cm long under the back foot is glued secondly.



A quick grinder pass give a nice and simple aspect.



For the pile under the feet the sequence of the battens is :
2 - 1 - 1 from top to bottom.

On the rocker the sequence of battens is :
2 - 1 - 4, from top to bottom.

Here ash making a contrast between walnut.

Sanding the excess glue reduces the width to about 37 mm.

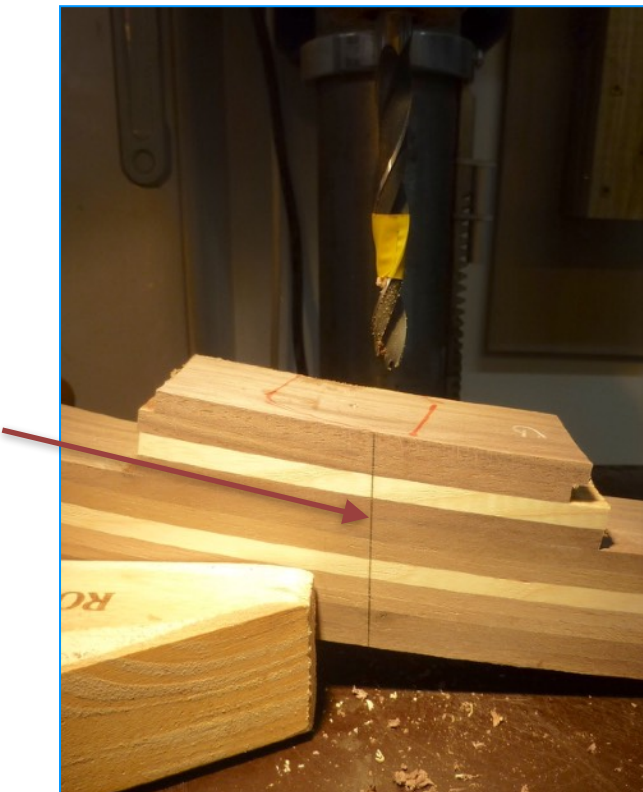




Installing the dowel :

The seat is placed on its rockers with stacks. A 10 mm copper dowel center is slipped into the hole of each foot dowel and marks with its point the drilling site opposite, the axis of the foot gives its direction reported on the side of the rocker.

The balance of the seat is already appreciable. The ideal is to see the front foot take off slightly with a small rocker back. If the seat is well balanced, it presses on its rocker, a little ahead of the back foot. A well balanced rocker deliver 90% of weight on rear feet.



The black line drawn reproduce the foot direction, it gives the direction of the dowel and its location with the trace of the dowel center tip.

This angle is respected when drilling 10 mm diameter and 30 mm deep on the drill press.

The 4 dowel hole are thus drilled on the drill press strictly vertical.

Adjusting the foot on the rocker:

The seat is reassembled on its rockers with its 4 dowels rear first, then front (no other way). Naturally the congruence is not perfect and it's necessary to adjust the foot surface in order to get a perfect contact with the rocker.. This approximation is sometimes very quickly sometimes not. I use a piece of sand paper slipped between the foot and the rocker to adjust little by little, this congruence.



Sculpture will be achieve later .
Here beech with wenge insert.

Sculpture of the foot-rocker junction :

The foot-rocker adjustment realized, 4 10mm dowels are set stabilizing the seat. They will be glued very late, the complete seat is placed on a support to work on each junction comfortably (my tablesaw).

Thus each junction is gradually carved using fine wood rape. I use French Liogier or Auriou, grade 9 and 11, also a sanding system with pneumatic cylinders Kirjes. With a little care, naturally the creation of this rounded slope with his contrasting insert give this very specific style. At the same time the feet are refined and the aesthetics of the seat is create easily.

The top edges of the rocker are rounded with a router bit to complete this junction. The sculpture can go to a complete round shape, I don't do so.

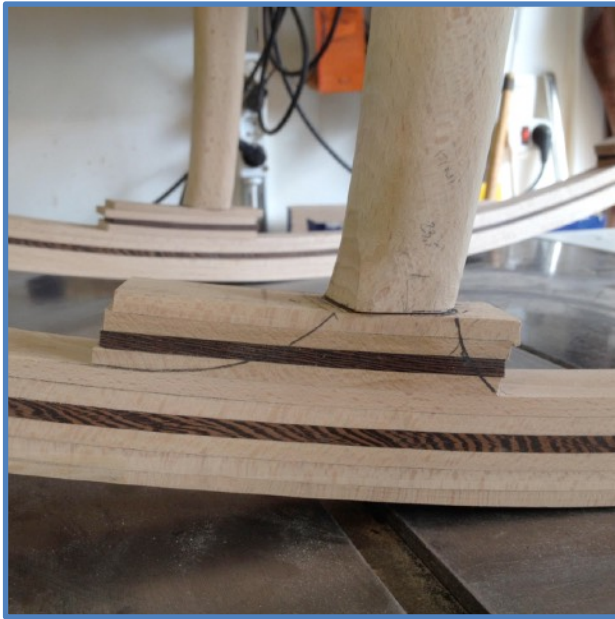
Then the front end of the rocker is connected in quite variable styles, of which I figure some examples.

The posterior end is decreased in thickness and rounded according to the examples also figured.

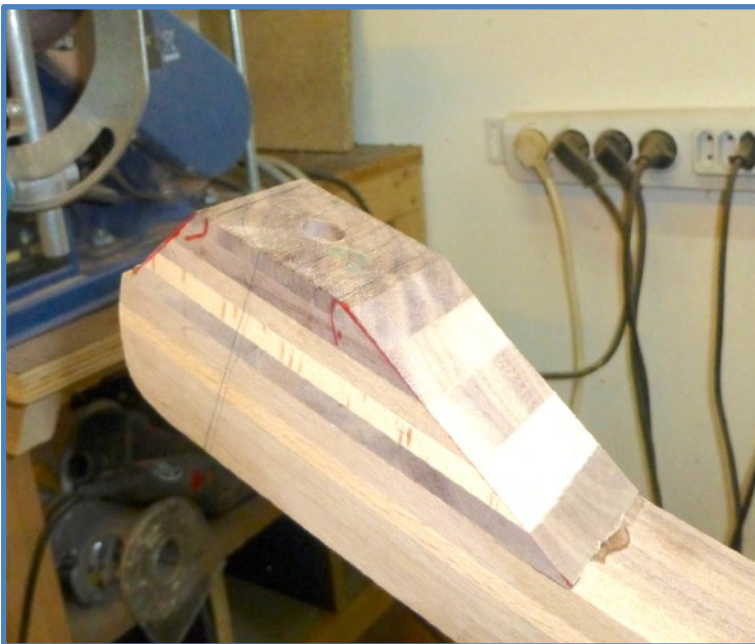
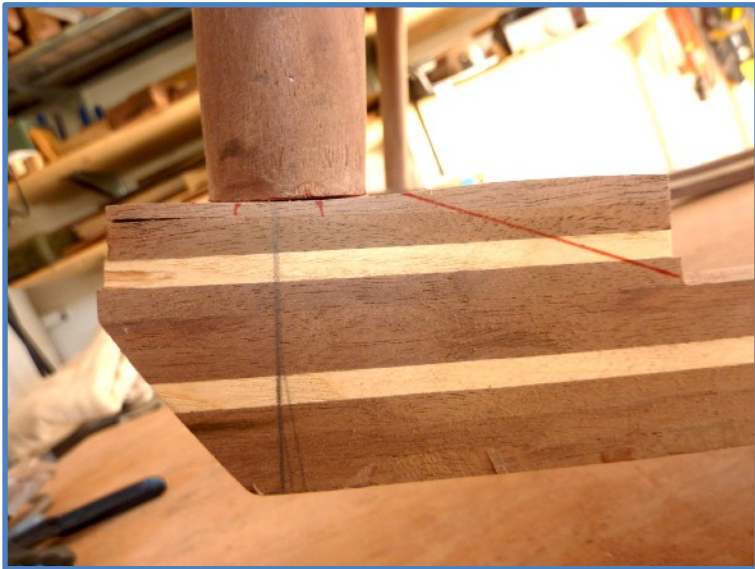
On the internet there are many examples more or less elegant, it is a matter of taste ..

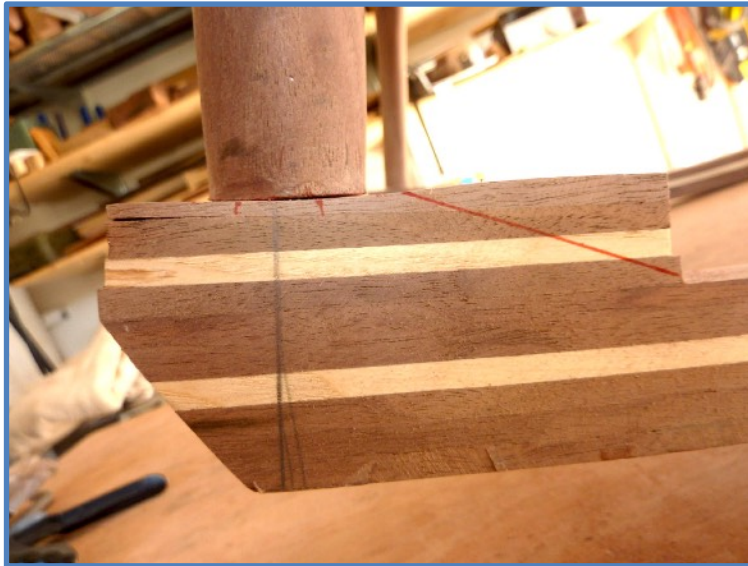
I publish here finishing elements of the rockers, because they will be glued after the global gluing of the seat. This primary finish will, for me, be protected by sticky paper to prevent glue burrs. A second overall finish of the complete seat will then be realized including the rockers glued permanently.







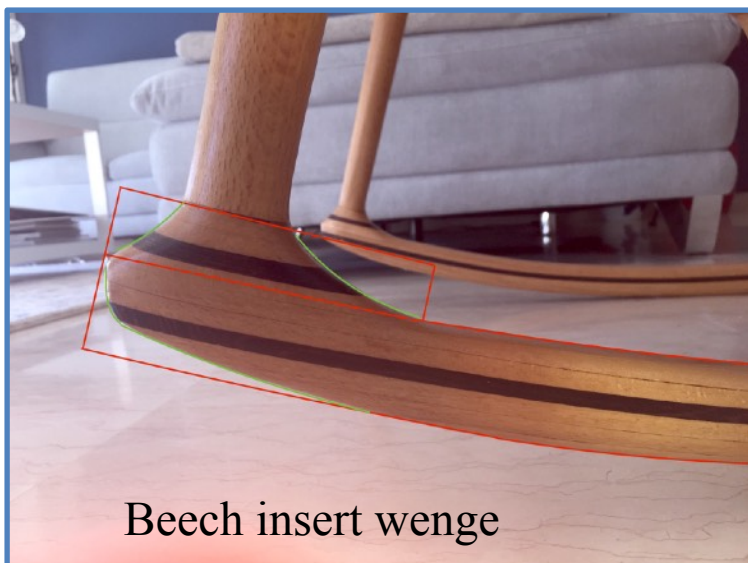




Front end sculpture

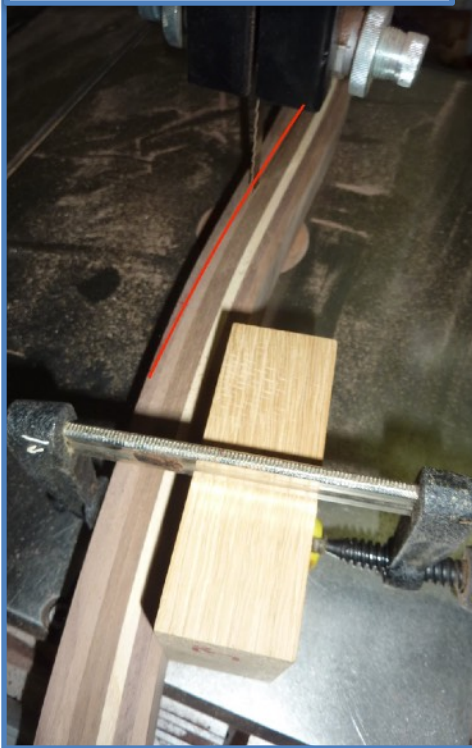


Walnut insert ash



Beech insert wenge

Distal end sculpture



The distal end of the rocker is thinned about 40 cm in sinusoid and carved in this way.



First layer of Danish oil.

The beauty of the walnut and the contrast of the essences is revealed.



The primary finish of the rockers is made in first intention.

The gluing of the rockers to the rest of the seat will be done at the end, after the seat got a first coat of finishing Danish Oil on it.

The paper avoids burrs of white glue.

Here a short version of the rocker (90 cm) for a narrow interior. The aesthetic is much less pleasant, but limits the size of the seat.

In conclusion for the rocker manufacturing , I go very far in sculpture and finishing of the rockers . They will be glued to the rest of the seat very late . Now the seat must be achieve with sculpture, gluing, additional sculpture after his gluing. Then the rocker balance will be done, before the final fixation of the rockers on the chair. Final finishing will give the end of the rocking-chair.

11) Final building - final sculptures :

Throughout its manufacture the symmetry has been respected by many mounting disassembly using the screws (14). The sculptures approached closer to the junctions, after collage they will be refined definitively.

A) The seat is glued in this order in 4 times, spaced by 24 hours :

The screws are set, but do not rely on them to ensure good compression, clamps will be used systematically :

1 °) Together front feet, rear post on the seat:

This allows compression of mortises by large clamps, 24 hours.

2 °) Headrest assembly and back slats :

The gluing and insertion of the slats in the seat at the bottom and in the headrest at the top is quite laborious, in particular the rotation must be well adjusted with a slight concavity towards the front. The fact that the 4 rear posts are already glued, simplifies this procedure, sometimes acrobatic, because each of the 7 slats must be fixed in rotation perfectly. A large clamp at the top, secures the headrest.

3 °) Gluing the armrests :

For each armrest the dowel is placed in front, the domino behind, the posterior screw can ensure alone here a good coaptation. A clamp attached forward reinforce on the front foot.

4 °) Gluing of rockers on the seat as figured in the previous paragraph, after sculpting and a first layer finish of the seat.

B) Protection against glue is necessary:

For my part I protect all the limits of the assemblies by a well-fitting ring of adhesive paper, to avoid overall the wood fiber to be impregnated with glue. This avoids a bad effect which will then, alter the penetration of the finishing layers. When the glue is dry, these papers are removed quite easily while, at the same time, starts the final sculpture of the joints , and the general sanding of the seat up to grade 220.



First stage : seat front feet and rear posts.



The double mortise makes a very solid and very rigid assembly, where 90% of the constraints of the seat pass. This seat thus has a structural lightness and does not need intermediate bars.

The weight of the seat with its clamps, makes it better to split in several stages, the gluing process.

The installation of the protective adhesive paper takes into account the risk of sagging of the glue.

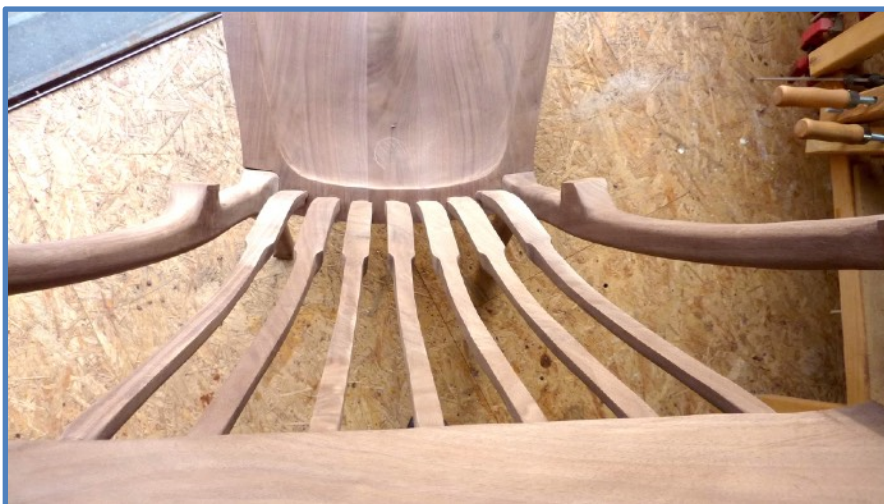
I use a classic Titebond 3 waterproof vinyl glue.



Second stage headrest and slats.



It is essential to control the rotation of the dorsal slats when gluing them, to reproduce the anatomical concavity of the back. Sometimes immediate bonding of the armrest is possible, but it requires a heavy clamp, in addition to the clamp of the headrest..



Third stage : gluing the armrests :



Gluing the armrests.

The seat fully glued, the final sculpture starts, very simple since it was possible to refine the furniture throughout its manufacture.

All junctions are carved and general sanding is done as the protective paper is removed.

The screws were also put in each phase of gluing. Head screw holes are of $\frac{3}{8}$ of an inch or 9.5 mm corresponding to my auger available to make ebony plugs.



4th stage : gluing of the rockers
AFTER SEAT BALANCE and first
finishing layer.

The ebony plugs are glued slightly salient. The sculpture and the finish of all the junctions starts. Obviously a little wood paste is sometimes necessary, no one is perfect.

Wood sanding go up to 220

The first finishing layer begins before gluing of the rockers, which too, has been prepared beforehand.

**BUT PREVIOUSLY WE WILL
BALANCE THE SEAT ON ITS
ROCKER..**



12) Adjusting the seat balance:

SAM MALOOF at the beginning was an artist and a graphic designer, he never had carpentry training and he started wood working by buying wood machines. He never claimed as a cabinetmaker or an artist. In fact looking her print from France I regard him as great « ébéniste ».

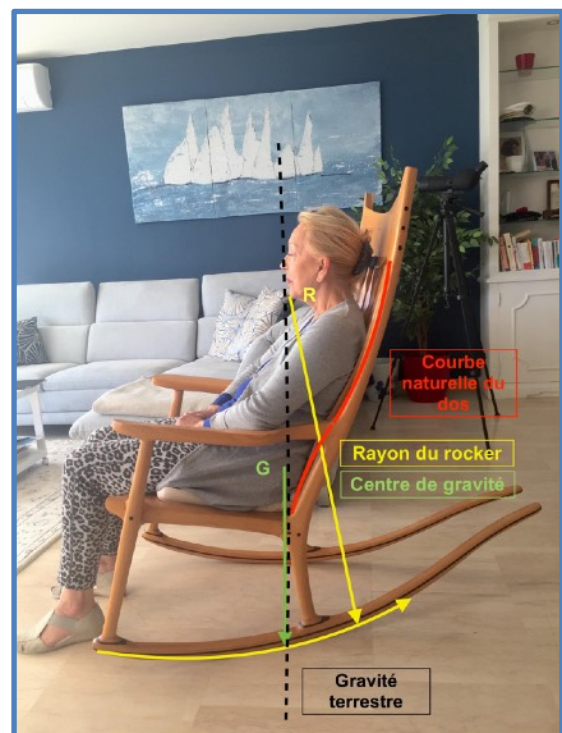
And yet the genius of Sam Maloof is to have designed a perfect anatomical and mechanical seat. Intuitively he describes, in his basic article in 1983, that the ideal support zone of the rocking

chair is one inch in front of the back foot. It is therefore initially an empirical method. In addition he chose an arc radius of about 1m quite instinctively, mainly for aesthetic reasons, curving a wooden slat..

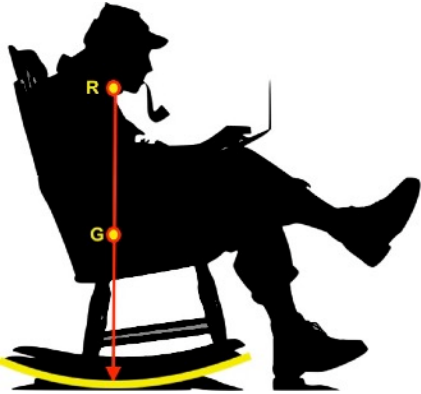
The mechanical result of this empiricism is that the seat easily toggle forwards and backwards when it is empty and when it is occupied.

In fact, making several rockers I realize that the chosen geometry means that the center of gravity of the seat is below and vertically under the center of rotation of the rocker, when the seat is well balanced when empty. If the center of gravity of the seat is outside this vertical the seat is unbalanced.

If the front foot is too long the seat does not like to tip forward, and if it is too short, the seat does not like to tilt back



But we must add yet another detail that Sam Maloof probably did not know : the physiological center of gravity of the human body is located in the pelvis, in front of the second sacred vertebra. In Fact the design of Sam Maloof makes the center of gravity of a seated man also vertical to the center of rotation of the rockers.

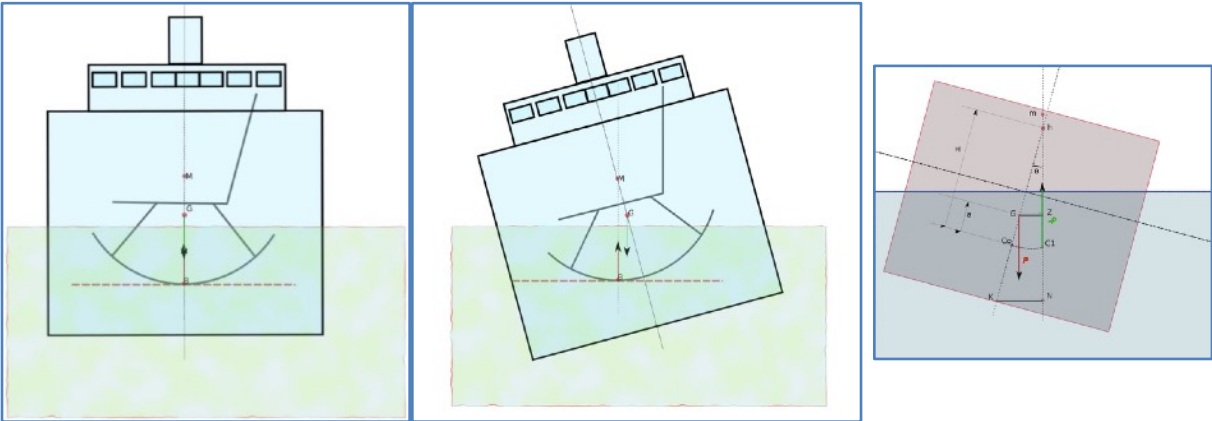


So when we sit in this rocking chair three points are aligned with Earth's gravity: above the center of rotation of the rocker, below the centers of gravity of the human body and rocking chair almost in the same place: It's a little above the seat and in front of the lower part of the dorsal slats.

These geometric elements determine effective recovery torques that some have compared to the

recovery torque of boats, in Wikipedia.

For a stable boat, the center of flotation of the hull must be above its center of gravity, otherwise it turns over .. At sea the roll determines a moment or couple of recovery which tends to restore the vertical alignment of these two centers. I think that such couple exist in a rocker each time, when these geometrical points loose their alignment. A mathematical definition of couples and mathematical laws are clearly describe in Wikipedia. But I cannot follow more the math demonstration ..





The adjustment of the seat and the good proportions are thus defined :

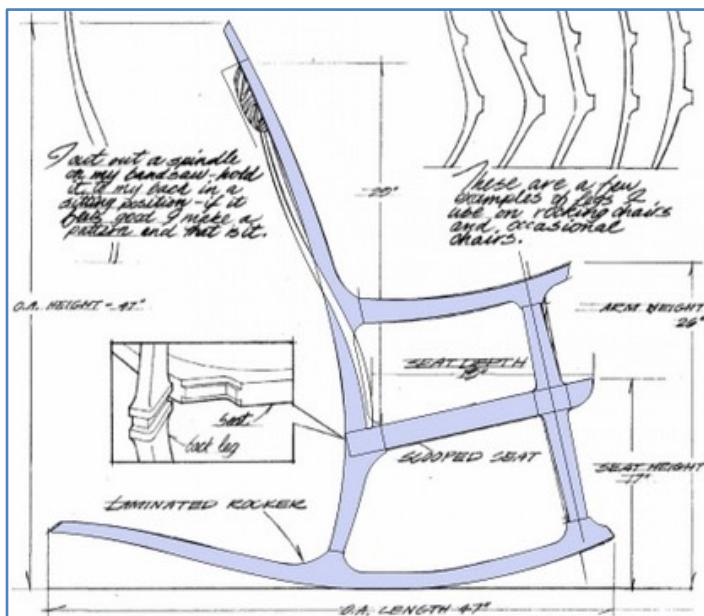
For a person between 170 and 185 cm.
For a 1m radius rocker, my measure are

From the screw of the 4 feet, to the bottom edge of the rocker, the ideal distance is, for the front foot 31 cm, and for the rear foot 24 cm. So for this curvature, this ratio should be 1.20 between front foot and back foot. If the seat is made smaller, this proportion must be kept.

In any case, before the definitive gluing of the seat the adjustment of the relative lengths of the feet must be made, so that the empty seat bears on the ground effectively 2 cm in front of the implantation of the rear foot. I reproduce what Sam Maloof write in his basic paper in 1983, and it's work fine I think for all rocking chair knowing his center of gravity and rocker curve.

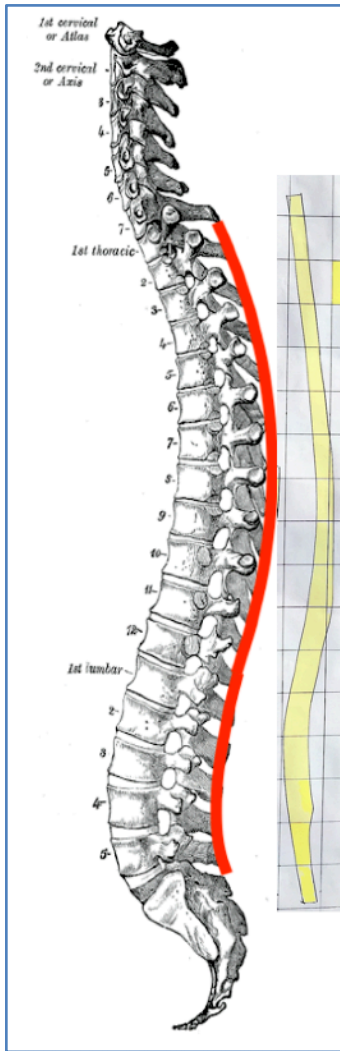
Below 1.20, the seat leans forward and don't toggle easily; beyond 1,2 too much backwards..which is also annoying.

When the proportion is good, the natural seat angle relative to the ground is 17 °, it is a fairly constant phenomenon in all my rocking chairs.



Excerpt from the article by Sam Maloof published in 1983 in Fine Wood Working. This is the only known article on him, where he summarizes all his ideas and developments, as well as the proportions of his rocking chair.

He has always widely disseminated these and there is no deposited model in the US. He has also published numerous videos on the You Tube channel, where he details technical points.



Physically, Sam Maloof's seat is perfectly in the image of the human spine anatomy in every direction of space. **It's a physiological seat, for an orthopaedist.**

The curvature of the slats is like the dorsal and lumbar curve of the back.

Transversally the distribution of the slats, in arch reproduce the convexity of the back also. He says it himself : "I made slat that went very well in my back".

Sam Maloof hesitated a lot on the shape of the slats that were rigid at first look, simply turned in a spindle. Also on the shape of the rear post, we see various evolutions of his seat that he produced since the 60s. At the end, the current definition of the rear post described in this manual is the perfect compromise in height and inclination for the human body, I just copy his published design .

So this seat without any upholstery structure,

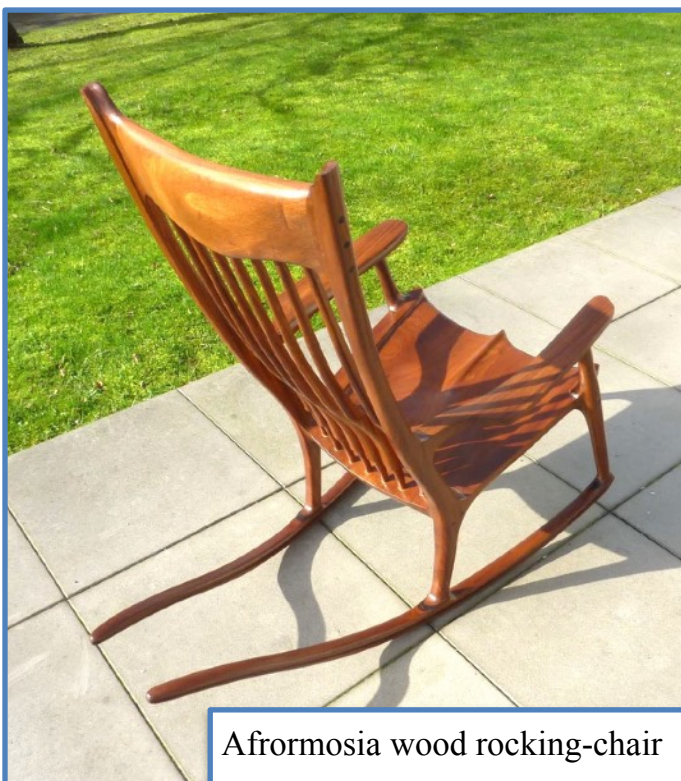
- is comfortable to sit in and easy to get out.
- It's molds perfectly on the back and the body of its occupant.

- The arms rest naturally, on the armrests.

- Its height is exactly the right one to sit naturally, but also to get up without effort.

- The rocking chair balances harmoniously with the slightest solicitation and totally relieves the muscular tone of the back which must control our posture when we are sitting.

- Empty , a small solicitation of a well tuned rocker gives more than a minute of gentle oscillations.



Afromosia wood rocking-chair

13) Finishing process is a 8 days trip :



The head screw holes are closed by an ebony dowel shaped with to 3/8 "or 9.5mm. They will be sanded with the rest of the seat. The underside of the seat will be prepared, carved and sanded as carefully as the rest of the seat.

- The sculpted joints are fitted to the fine grade and then nice finish with a Kirjès pneumatic polisher up to 180.

- All the sculptures are finely sanded to 320 on the visible parts. The others are 240.

- The seat is carefully sanded with iron wood « 0000 », avoiding going against the wood grain, which can leave metallic particles. Then it is rubbed with dry cotton cloth (old T-shirt) which gives a particular luster. Dusting with compressed air is necessary, between each time and before the passage of the finish.

- For my part I have only the experience of the Danish oil "DANISH OIL" which is a mixture of Tung oil and various components according to the manufacturers.

It is done with a brush, then smoothed with a cloth, to avoid over-thickness. This oil gives a hard, satin finish that resists water well.

Each layer is spaced 24 hours apart.





- The beginning of the 3 layers of Danish Oil is a very pleasant moment in the workshop because the walnut then gives all its warmth and its beauty, and it is a bit of a reward.

The first layer is diluted with 15% white spirit, the second 10%, the last 5%.

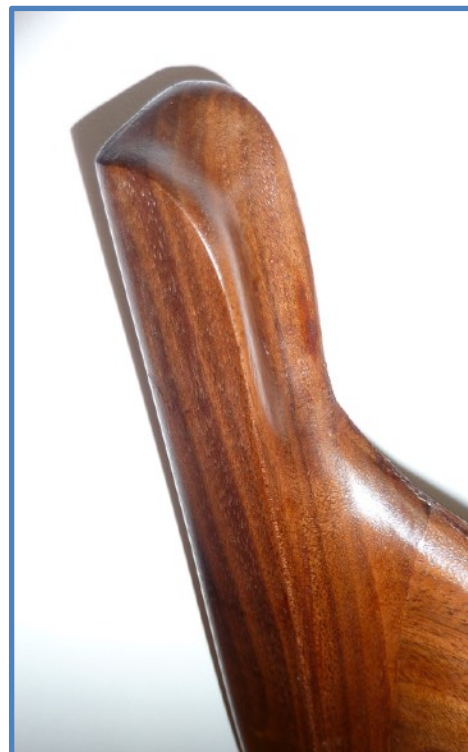
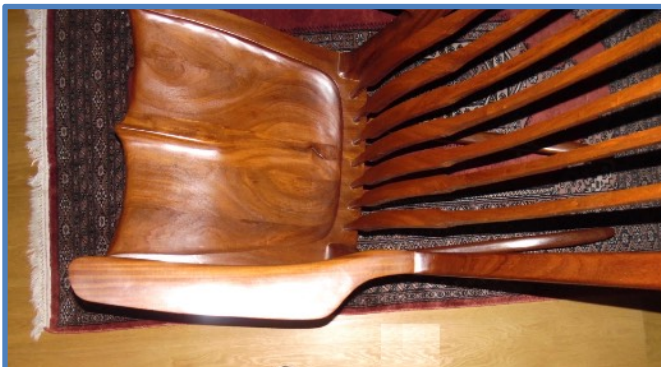
- then I spend three layers of colorless oil-wax spaced 24 hours

- Between the layers, spaced 24 hours, I rub cotton rag.

Finally I apply rich carnauba wax (carbamax rustic walnut color) passed with a pad of iron wool 0000 dipped slightly in turpentine. I finally polish with a cotton cloth. The last

layer of carnauba wax gives a satiny appearance, it will be the bottom of hard wax, on which the maintenance of the seat will be renewed with ordinary beeswax.

I advise against getting into tint, the seat is too complex.





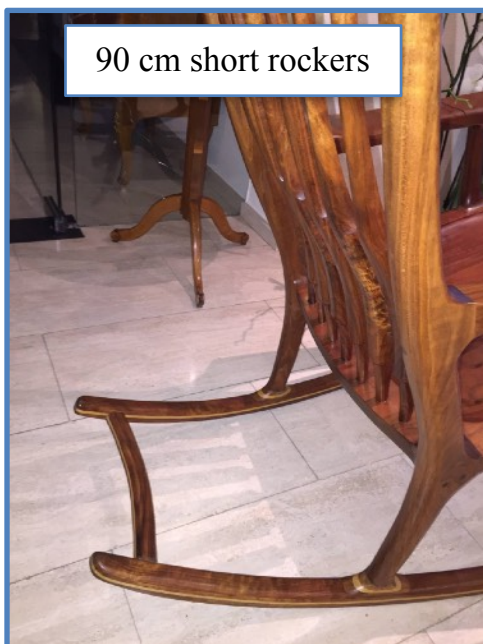
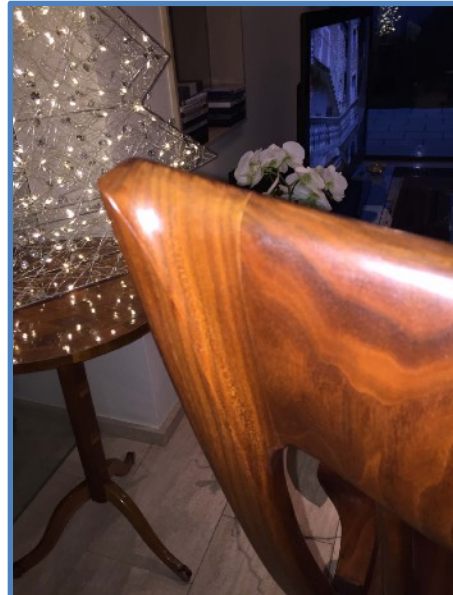
Here I fit 7° internal rotation of the rear post. In order to shape more.

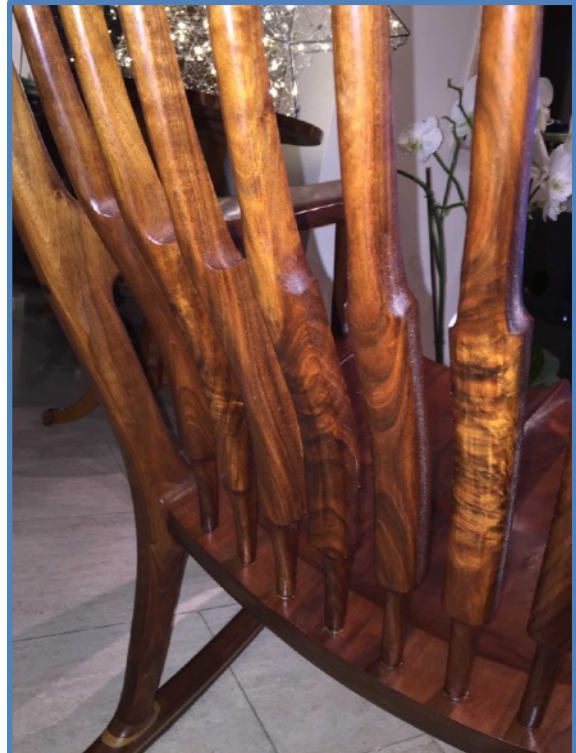


14) Variations :

Throughout the text we have noticed that it is possible to make the rocking-chair with variations of essence and aesthetics, in fact they are all different.

- presence or absence of "horns".
- variations on the length of the rockers from 1.35 m, to 90 cm. Sometimes adding a bridge between rockers back on very short rockers.
- variations in the sculpture of the front foot and the end of the rocker.
- variation in the layout and shape of the armrest and its cutting back.





Laminated or sculpted slats



Long rockers 1,35 m



Beech Rocking-Chair , wenge insert, laminated slats, with « horn »



Inferior side of seat before gluing.



I start from an old friend cherry tree a project, for a French « Provençal » style rocking-chair. It's a 3 years project waiting the wood to release his cracks and humidity. Like marine carpenter, I try to use natural wood fiber, and plan a full plaited straw



Simple tinted beech rocking chair, very short for veranda, with upholstered seat or seat in plaited straw.
This type of seat is more enveloping and more relaxing because it wraps over the thighs.



Finished cherry « Provençal » inspired rocking chair.



Conclusions :

It takes about 200 hours to make a rocking chair according to Sam Maloof, including a huge part devoted to finishing.

This manufacturing is atypical and very daring, including the technique of shaping with a grinder the seat, armrests and headrest. Grinder is a relatively brutal and dangerous machine. It allows however to advance fairly quickly at certain times of digging or adjustment, but with many risks of false roads that could ruin the parts involved .. But daring pays, and it shows the interest to take new ways to explore. For example, to discover by these daring gestures aesthetic possibilities, which one doubted of itself.

The technical times are mixed and often simultaneous, with round trips of montages, disassemblies, adjustments, sculptures started at first, then completed after gluing. You have to be opportunistic and enjoy a good exposure, to advance on a detail. Most of the sculptures at the level of the assemblies are done by approximation, progressively: generally the rough time on disassembled part, the finishing time on the assembled part. Strength is guaranteed, thanks to the use of Lamellos, dowels and Dominoes that reinforce all glued joints.

From a personal point of view, the manufacture of this seat allowed me to discover in a more general way, the capital interest to work with noble woods. I now know where they derive their nobility because they offer veining and texture, where the simplest finish, based on oil-wax, gives very silky touches and remarkable patinas. Walnut, oak, ash and beech are woods that are physically pleasant to work with, and their smell invaded the workshop. They give the pleasure of creating a beautiful object with his hands.

I feel all over the discover of this seat, that my wood working skill has really increase. Naturally an aesthetic sense rise with quality of work. At one moment you see your hand working naturally fine, and out your control. it's was the same, when I become an advanced orthopedic surgeon. Manual work is deeply human.

I put in this text all my knowledge and my personal tips on this seat as I discover gradually the Sam Maloof 's technics which are overall very demanding. I think it's nothing to hide his discoveries and everything that can be transmitted, must be.

This was also the approach of Sam Maloof , a man I deeply admire, who has never hidden his techniques.

Bibliography and references

1) Two paper from Sam Maloof published in **Fine Wood Working** :

- « *You just have to try, you have to use your imagination.* » FWW September 2005 N°179 :

- « *How I make a rocker* » FWW March-April 2016 N° 253 :

Renewal of FWW N° 42 , 1983, where all the process is summarized in 4 pages.

2) TWO EXHAUSTIVE BOOKS (on Amazon) :

- The furniture of Sam Maloof by Jeremy Adamson Smithsonian American art Museum
WW Norton & Company. www.wwnorton.com
- Sam Maloof woodworker- Kodansha International.

3) My internet site :

www.my-rocker.be

4) My gallery FINE WOOD WORKING :

<https://www.finewoodworking.com/profile/Zimmermann17>

5) Internet site of fine rocking-chair maker :

<http://sammaloofwoodworker.com> with **Mike Johnson** who hold the legacy of Sam Maloof Foundation.

<http://finewoodworker.com> with Scott Morrison

<http://www.haltaylor.com>.

<http://charlesbrockchairmaker.com>

<http://www.jmoldovan.com/>

<http://www.jimhammer.com>

6) PINTEREST site :

<https://fr.pinterest.com/explore/sam-maloof/> :

7) Youtube gives most of Sam Maloof videos.

My You Tube videos :
richard4624

Supply :

William Ng from Los Angeles, easily ships a complete game, in ½ diameter router bits.

1) **William Ng** : “Whiteside 4pc complete 5 degree chair bit”.

<https://wnwoodworkingschool.com/shop/whiteside-4pc-complete-5-degree-chair-bit/>

2) **WHITESIDE**

<http://www.whitesiderouterbits.com/>

1) Chair Making bit ¼” depth of cut 5/8” cel, ½” Shank : *part#09-165*

2) roundover ball bearing guide : *part # 2009*

3) 5° Chair bit 5 degree taper, ¼” depth of cut 5/8” cel, ½” Shank : *part#09-163*

4) 5° Chair bit 5 degree Negative taper, ¼” depth of cut 5/8” cel, ½” Shank : *part#09-164*



These router bits are all necessary for this project

