



How to make your balisong with few tool

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How to make a balisong (butterfly knife) with few tool.

I try to prove that you can make a butterfly knife without all the knifemaker tool.

I hope that you will have so pleasure to make your own balisong that I have had to realize that tutorial.

Caution: The realization of your butterfly knife will require to resort to tools being capable to cause serious wounds. I invite you to use them with the greatest precaution and to discover their operating modes by reading manufacturers notes. You will have also to handle a heat source in order to carry out the heat treatment. I invite you to take all the precautions necessary not to wound your entourage or you even. Insulate, and warn the people neighborhood whom you will handle possibly dangerous tools. I also invite you to wear gloves, masks and glasses. Perhaps you will be like an alien, but that will avoid you possible nuisances.

The author of this text do not can in no case to be held for person in charge for the possible incidents who would occur at the time of the realization of this tutorial.

Material Necessary.

Raw materials and consumable

Two file (matter)

3mm pins for pivot handle and 2mm pins for the other (steel for the pivots, aluminum or copper are usable for the remainder), (mild steel nails can replace the rivets)

4 Washer (bronze, or brass)

Sand paper : grit 80 - 120 - 180 - 600 (you can choose other grit :D)

2 HSS DRILL 3mm et 2mm.

2 mild steel nail of 2,5mm

1 pan with 1 liter of least expensive possible oil.

Matériel

Hacksaw

Vice

A small punch with a scribe (can be replace by a steel darts point)

1 Dremel or a copy, with drum of sandpapering, mills diamond, disc to be cut up, felt for polishing...

1 Hammer (see two of different weights)

An aggressive file

A soft file (but man can play without)

Needles Files

Drilling machine (possibly with column

Possibly

a sander with grain 80 and 120

A heat source for the heat treatments or softening. (for example a blow lamp (standard Butagaz) or a blowtorch.)

Start Point.

The files are soaked. Consequently, steel cannot be worked in this state. It is initially necessary to soften the file to make more it "soft". For that, it is necessary to heat steel in the neighborhoods of 700° to the blow lamp or with the BBQ. For the BBQ the simplest method consists in putting the file in ember while you made roast sausages and merguez and you come to leave the file at the end from the meal, (once the made crockery for example). The preceding heat treatment (hardening) will be completely cancelled. Once the softened file, you can cut it into two to the hacksaw. I make in a file two blades, one of 5 cm edge and the other of 5,5 cm. You cross, of course according to the size of blade which you wish to obtain. (the tuto is carried out on a blade of 6,5 cm with 5,5 cm of edge.)



The two parts are cut.



In order to more clearly visualize the profile and the design of the future blade on which one will work, you can trace with the CD marker contours of the blade, as well as the height of the bevel (the line in the center of the file) and materialize the site of the pivots and tangs pins by points. Here to illustrate the matter the blade will have reverse tanto profile.



With hacksaw you cut the point bevel.



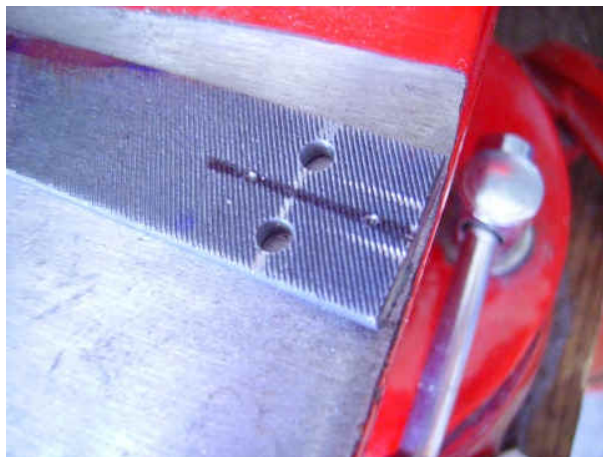
Then, format with the drum of Dremel sandpapering coarse grits (40) to 30 000 tours/mn. I point out that the work of this strongly high-carbon steel will cause very many sparks, protect you to them eyes, the hands and avoid wearing synthetic fiber clothing.



Then, mark the points to be bored for the axes with a punch. The points of drilling are to 1 cm of the heel of the blade and 3,5 mm of each edge for a riveting of 3mm.(which leaves a margin of 2mm of each with dimensions of the pivot.)



The two openings of the pivots are bored. One sees the line traced in order to have the two perfectly aligned holes.



One marks the two tangs pins holes (the nails steels of 2,5 mm slightly improved, put in force and stuck to epoxy in holes of 2 mm). Keep 2 mm of bottom margin, thus mark with 3mm and in the same axis, fix at 3mm top of the pivots to allow the pivots to turn.



The holes are bored.



The heel edges are rounded with Dremel (sandpapering drum coarse grits.)



The bevel is the longest part and most delicate of the blade manufacture. Carry it out using the most aggressive file you have. I voluntarily leave an intact line comprising the traces of file of the point to the heel (2mm - 3mm on the level of the point). Once the blade fixed on a support well flat, attack with the file in order to carry out bevel, most gently work possible without you to press. Remove the matter methodically with dimensions then other, check each time the symmetry of the removal of matter compared to the future wire of the blade. One will take care to leave a wire of with little meadows 1 mm in order not to burning steel during the heat treatment.



Once desired bevel obtained, one polished coarsely (with the sander for the lucky ones and with the hand for the others), until removing the largest part of the blows of files. One can start with the smooth file, then a hold to be sandpapered and papers of grit increasingly fine, up to 120-180. Not the sorrow to try mirror polishing before the heat treatment. Another method of enough effective sandpapering for all to level. Roll up a sandpaper sheet around a sharpening stone wedge there in small vices. Then apply the bevel of the blade patiently and gently. While going down more and more in grit. (It is almost a hold to be sandpapered with back).

Hardening and the Furnace



The two blade are ready, on for the heat treatment, the other the have the bevel..



My summary hardening station, a blow lamp, a pan filled with oil of crackling which I heated as a preliminary until the first quivering of oil in order to flux it. One sees a cake mould there filled with water, I confirm that it is not an excellent idea to soak with water this type of steel,

the continuation will prove it to you. To carry out hardening, to heat you the blade until obtaining a red cherry (locate preferably in a part sinks itself) and at the time or steel is red cherry (and becomes non-magnetic) plunge the blade in oil. A "siccht" will occur. Stir up well the blade in oil in order to cool it completely. Leave there and pass a file to metals on the blade. If the file (or saws it) bites would be only a little steel, hardening did not take. (the blade was surely too cold at the time of the dive in oil), if the file slips on the blade, it is perfect. (Normally during hardening calamine bursts when one plunges the blade in the bath of hardening, which gives a color grayed to the soaked part.)



Small a two hours income in the furnace of the kitchen with 220-250°C (nothing prevents from carrying out the income during the cooking of roasted or cheese tart). This operation will make it possible to return a little elasticity to steel and to remove part of the stress of to hardening



The blades on the outlet side of the furnace, they are quite crusty.



I carried out one of the quenching water and here is the result, the blade did not support. A slit on all bevel with cm of the beginning of the edge.



Another slit view



The two blades, that with the crack will be softened, re cut and will finish in "nano bali" and mini spur cutter after being retempered and gone up.

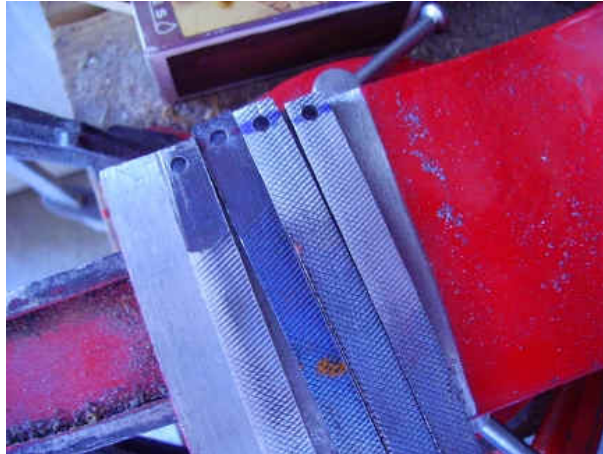
The Handle



The handle realization is tackled. Once again out of file. As you see it, fixing of the file on a support and then cut in its center with the hacksaw (with a good quality blade one gains enormously in cut cleanliness and time). The handle will make to final 7,5 cm length for 7,5 mm of width.



The 4 pieces of the handle are cut, now it is necessary to rectify the irregularities and, if it is not the case, to put all the handle at the same width. (Some files inevitably do not have the same width on all length.) To put them the same width, I use the enormous file at side, it is hyper abrasive and effective. If not for the lazy ones or people equipped, the right angle driver or the sander coarse grains will make the deal very well.



Once the handle with the same width, carry out the holes for the pivots. Mark each branch in its center with the punch, ($7,5/2=3,75$ mm of the edge) the 0,75 is done a little with judged because my reglet does not go that at the half mm .On is located at 3,5 mm of the top in order to have 2 mm of margin to make round branches around the axis.



After drilling in 3mm for the axes. (a point that I had forgotten to mention is well to check the perpendicularity of the drill press. Indeed if the unit is slightly inclined, that is likely to obstruct the rotation of the pivots.)



The four handle parts are bored.

Drilling and Spacer



This part is a fall of rasp 4 mm thickness which will use to me to carry out the spacers. These small parts which give the thickness to the sandwich of the handle. These spacers will make all the width of the handle is 7,5mm. Before making drillings, mark with the point a rectangle of 5 mm on 7mm. And, with the punch made two pre holes with 2,5mm of each edge. Drilling will be of 2mm. After that cut the part to the hacksaw.

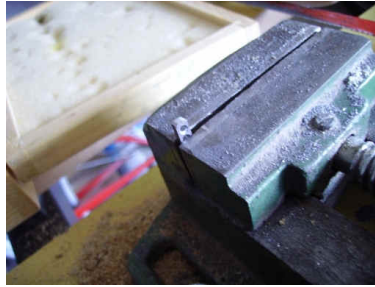


The different parts.

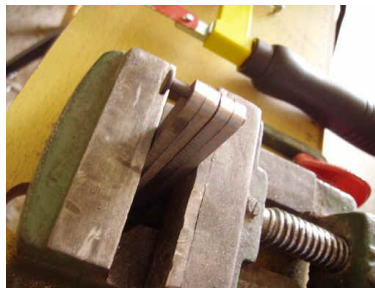


Once the spacers carried out, it will be necessary to bore the holes on each part of the handle. It is necessary to pay attention so that the blade has sufficient clearance to swivel without meeting the spacers. For that, assemble a handle part on the blade the pivot which will be to use for the final assembly (in our case a rivet steel of 3mm). and made a feature with 2mm of the point of the blade. It is on this mark that the with dimensions superior of the spacer will come to take seat. To position the spacer at this place, using a point, mark the first hole. Second is marked with the punch by taking care to maintain spacing between the holes of the spacer and those which will be on the branches. (I practice as that because it happens that

drillings are not always perfectly at the point desired thus this method more or less makes it possible to limit the variations). Once one of the branches bored, fix on not bored it and are used of as guide for drilling. I council to make drillings per pair and not on the 4 at the same time. (2 for each spacer), because it may be that your drilling of the spacers does not have exactly the same spacing on one or the other, unperceivable with the eye, but during a hard riveting that will feel.)



The spacers did not have the perfectly smooth dimensions, consequently it was necessary to wedge them in a small vice and to smooth the whole with the drum of sandpapering Dremel coarse grain then fine grain.



Put the pivot in the four handle part maintained in the vice and round with the drum of sandpapering coarse grits with 20000-30000 turns that goes rather quickly (less than two mn) On can also do it with the sander fixed on the bench. It will be the part which one will make go and to come on the tape.



I like to show a first assembly to check the general aspect. I use for that of traditional screws and bolts. On the other hand I carry out an assembly of the parts such as they will be it with the final one, with the washer of each with dimensions of the blade. The tang pines are not assembled yet, therefore not of thrusts.

This assembly enables me to visualize the kinematics of the “beast” and to plan the final improvements to be made. I also check that the handle blocked at any time. That the spacer are placed well.

It remains to carry out the tangs pines. Here 2 nails steels of 2,5mm slightly refined and forced in the holes of 2 mm. It is also necessary to produce the latch and to bore the branch on which it will be assembled. Once these two operations carried out all the completions will have to be carried out. (fettling, district, polishing of the handle on both dimensioned, fitting of the handle on the thrusts....

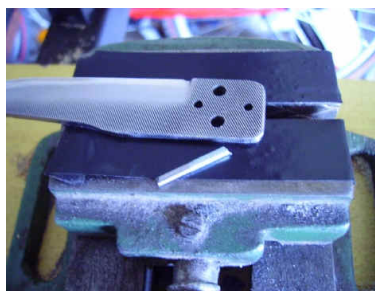
Tangs Pins



In order to carry out the tang pine, take a nail out of stainless steel of 2.5mm of diameter of which you will cut the head using the disc to cut up Dremel.



Then, install the point obtained on a drill press (on a drilling machine or Dremel in the chuck that functions too.) Made turn the point at low speed and apply a file very slightly (soft preferably) above in order to reduce very slightly the diameter of the point to be able to introduce it into the holes planned for the tangs.



After that, cut the stem of steel to 4 mm (2mm of each with dimensions) moreover than the result of following calculation:

Thickness of the blade + thickness of the discs + thickness of the two handle.

Here we must be located at the 1.6 cm length neighborhoods. Put a drop of adhesive epoxy Bi components in each hole designed to accommodate the tangs.



In order to carry out insertion in force of the tangs, protect the blade by applying a little electrician Scotch tape to bite of a small vice which you just sufficiently half-open in order to let pass the steel stems.

Of this manner you have a plane surface and you are not likely to deform the blade by hammering the nails in the holes. This operation is not to practice in force, some small blows of hammer in order to equalize well the size of the steel stems which exceeds the each with dimensions one of the blade.

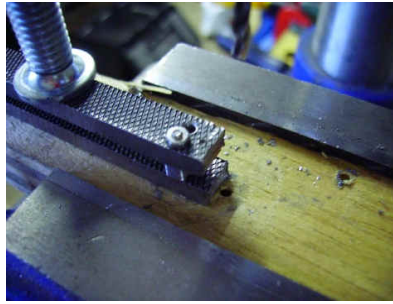


Once the tangs pines installed, I "fix" the handle with the rivet which will be used for the assembly in order to have final kinematics. I make swivel the handle until the contact of the tangs, then it is necessary to mark with the three-square file (or the scriber) the center of the residences of the tangs. After patience and round file in hand, profile the cavities on each branch. By taking care to check well very regularly that you do not remove too much matter so that the tangs always play their office.



2 illustrations of the tangs.

The Latch



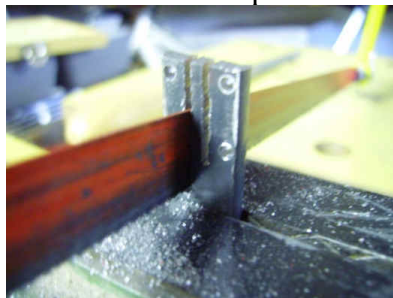
Preparation of the installation of the latch, barbarian version. The two handle assembled together with the spacer in place, mark with the punch the center of the branch which will receive the latch here at the request of Alelser that will be an assembly on with dimensions sharpened blade.



The handle are bored, the holes will be well opposite one the other. (Well in on position can carry out drilling by marking each branch to the punch and bore them separately.)



The latch, I chose a laminated steel part a 24-1 steel which one finds in all the stores of do-it-yourself (0.17% of unusable carbon to make a blade but out of matter...) The part is pierced with two holes of 2mm. to find the spacing, prepare the final assembly without riveting, and placing the plate of the future latch with the first hole carried out in the site of the drilling of the latch. From there, ridge to swivel the handle of with dimensions (open) and other (closed) and mark the point on the latch which will make it possible to lock



Cut with hacksaw

Handle Cleaning, Toxification, and Finishing



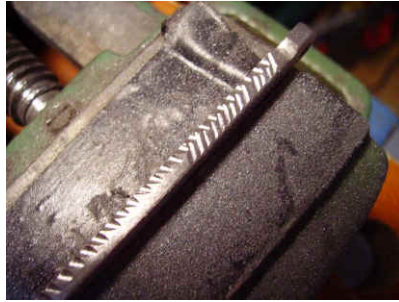
After having carried out the latch, the handle and makes an assembly of test, "clean" the handle in Dremel, level the part which will be in contact with the spacers to decrease by a half mm the thickness of each piece of the branch and in order to obtain a quasi smooth surface in contact with the aforementioned spacers. Cleaning with started with the sander grains 80 in low speed, then in Dremel in grains 120 at high speed. In this manner in 80, one removes part of the matter of the scratches of the file, and I made a barbarian "polishing" into 120 in order to preserve the grip without however filing the fingers with each use



A small toxification of the handle to the diamond grinding stone can be added on the section. It is more decorative than another thing.



Attack with 45° in direction of the pivots of the handle (moreover it is a compromise between toxification and "guillochage").



Then with 45° of the other with dimensions always in direction of the pivot. This applied each dimensioned each part of the handle (either 8 with dimensions for those which count well.)



Then with the drum coarse grains of Dremel, round each end of the latch by taking care not to remove too many matter and kill thus the hole.



Since you are quite hot you can make a small toxification of the latch on the 4 with dimensions ones.



That is made

Assembly, Grinding and Sharpening.



Once the latch finished, Carry out T with a nail stainless of 2,5mm, cut the head man (by wedging it in vices), using the discs to cut up Dremel. Then assemble the nail in the Dremel (or a drilling machine) chuck and apply the two seconds at low speed to a file in order to decrease very slightly the thickness in order to be able to insert without forcing the first mm in the latch. (Even process that for the tang pins).



After a vice, a hammer, insert in force until half of the nail (always the same process as for the tang pine.)

We have all the parts, one will be able to carry out the assembly of the bali. (caution it is the most delicate part)



Adjust all the parts. A small easy way to place the spacers. Introduce into their sites the rivets and make slip the spacer places from there, then made similar with the branch (rather than to put the spacer places from there, then a rivet, then the other). Another council, if the holes are not aligned perfectly, take an electric screw driver at chuck, a drill of the size of the holes put and made some go return at very low speed in the assembly. In a this round way one correctly the holes and increased of unperceivable manner but that facilitates the assembly largely.



As you see it, the riveting of aluminum is done very well, I use either of bite vice, or of a steel bar like support. I leave in general 3-4mm matter be riveted and I clean afterwards. It is a little barbarian, but cut too short a rivet, and that will be super hard to recover the trick. (For riveting a light hammer is enough, especially for aluminum). Personally I leave the rivets as that until A what I carried out all riveting. For those which does not manage to put the hand on rivets aluminum or copper, it is possible to rivet with mild steel nails slightly more significant than the holes. (2.5mm for holes of 2mm). In this even technical case that for the tang, one decreases the thickness, one inserts in force and one hammers in order to round and one cleans. That is valid for all riveting except the latch which him must be able to swivel. (a nail of the size of the hole will make the deal).

Then rivet the latch. Even technical (I have nevertheless to make a small cleaning of aluminum to be able to let appear the holes.

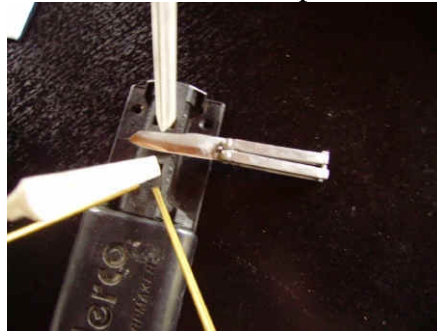


If all is OK, the latch must locked the bali in closed and opened position.



For the pivots steels, final improvement of the top in the same way as thinning of the nail for the latch (in the chuck of Dremel and contact on file). Then, patient riveting, always with 45° of kind not "to crush" the branches and to wedge the "flip" (perso 45 mn to rivet the two pivots). Initially with an average engineer's hammer, then then with a lighter hammer to round the with dimensions ones. The goal is to arrive at "champignonner" (obtain a mushroom head) the rivet without blocking the pivot.(Not to forget nevertheless to put the discs) After that, the assembly is finished. If you riveted the pivots too violently and that that "seizes up" a little, place a flat screwdriver between the branches, just on the level of the blade, and try to draw aside these last very slightly. Gradually without never forcing (risk to twist the branch, to damage the screwdriver, to destroy riveting). Once that all functions pile

hair (without oil), one can add a small oil drop in order to still improve the pivot. The surplus is cleaned, which makes it possible besides to remove all the steel filings which trail in the pivots. Again an oil drop, and it is nickel chromium plates.



One can thus pass to grinding, then sharpening, I used the 204 Sharpmaker de Spyderco, but any stone to be sharpened will make the deal well. I used an angle of 30° of grinding and then 40° for sharpening as Sal Glaser recommends it for a sympathetic edge. On the whole they is meadows of 400 passages on each bar (400 on stops in average grain of each with dimensions, 400 on the dish in average and similar grain with the white bars in fine grain.) It is really hard the XC90, and yet I had really left anything like matter on the level wire. After that, a softening with the sandpaper 400 of each one of stop possible. Mushrooms of the pivots, T of the latch, the with dimensions ones of the branches, possibly dimensions of the blade.... Best, it is to handle Bali and to see or possibly that hangs a little. Then cleaning. A blow of polish (felt on Dremel and paste of completion) on the blade in order to remove all dirtiness's which accumulated and the baby will be able to fly away.

Technical Characteristics and Finish product



That gives us Bali with a blade of 6 cm from including 5,6 cm sharpened out of steel resulting from a file. (Xc90-xc120)
an open total of 13,2 cm.
8 cm closed.

The handle are also out of file with metals.

9mm thickness for a weight of 66 gr.

The latch and out of steel 24-1 spacers in rasp.

Tang pin and T of the stainless steel latch.

Riveting aluminum and steel rehear for the pivots



Pivot are sanded and sweet.



Focus on riveting



Focus on toxification.



Handle pins



Handle Toxification.



Closed.

I hope that you took pleasure to discover this tutorial and I hope especially that you will try the experiment.

If you try the experiment, do not hesitate to send the photographs of the Baby to me (finished or in progress) and to ask me all the questions.

For any further information, you can contact me on:

For the French questions : of France-Balisong.info forum (under the Aragorn999 pseudo)

For the English questions UsualSuspect.net forum (under Cardoso5fr pseudo)

@ + Ben