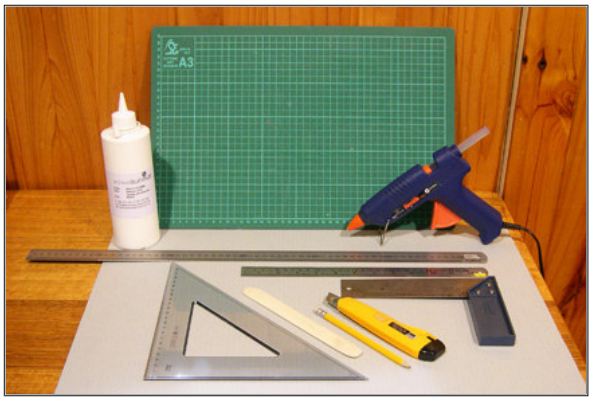
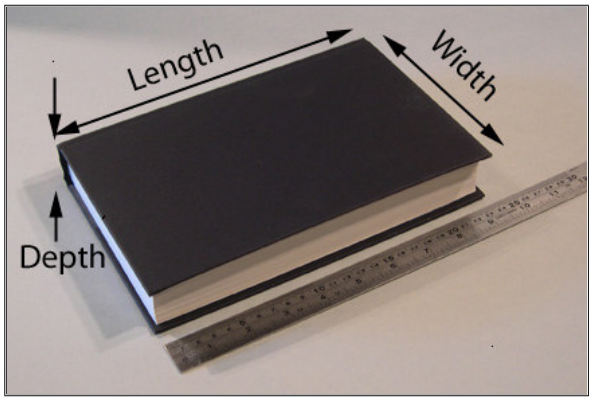
Making a Clamshell Box

This box with a clamshell lid is reasonably quick and simple to make using only basic craft tools.Its design can be readily adapted in shape and size to accomodate a wide range of objects. For the purposes of these instructions the box is shown as being sized and shaped to hold a hard-back book.



[1] The tools required are quite simple - a craft knife, a steel rule, a set-square or carpenter's square, a pencil and a bone folder for creasing and folding card. As a substitute for the bone folder a table knife with a rounded blade end, or a pate knife can be used. A cutting board or a pad of paper is needed to protect your work surface when cutting. To glue the box together you can use hot glue from a hot glue gun or archival-quality PVA adhesive, available from art shops and suppliers of archival materials. Hot glue dries quickly (in a matter of seconds) but this can be a disadvantage at times if you don't get things quite right in positioning the pieces to be joined. PVA glue gives you more time to adjust things yet still dries quite quickly. If you are not familiar with working with hot glue it might be better to use PVA, at least for your first boxes.



[2] Begin by measuring the object for which the box is being made. Here we are using a book as a convenient object example. Measure the length, width and depth of the object, making sure that your measurements include any projecting bits and pieces. If the object has an irregular shape you will need to decide what you are going to measure as its length, width and depth.

Box inside length, l :
l=Object length + clearance

Box inside width, w:
w=Object width + clearance

Box inside depth, d:
d=Object depth + clearance

[3] Next you need to decide how much space you need to leave around the object when it is in the box. For example, will you be able to lift the object from the box by handling only the top of the object (it might have a handle), or will you need to be able to get your fingers or hands down to the base of the object to safely lift it? If it is a heavy or very fragile object, will two people have to be able to get their hands to the base of the object? If the object is fragile, there might need to be room for padding, particularly if the object is to travel.

Once you have decided the clearance you need you can do the simple maths shown above to work out the inside length (l), inside width (w) and inside depth (d) of your box.

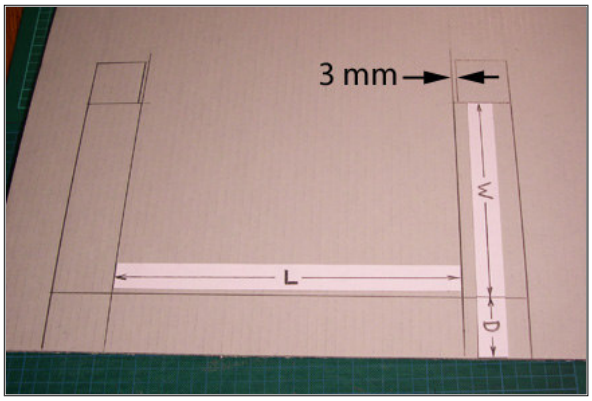
Box marked-out length, L :
L=l + 2 X board thickness

Box marked-out width, W:
W=w + 2 X board thickness

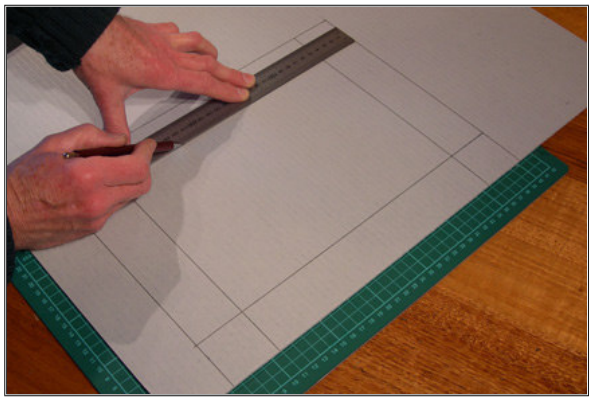
Box marked-out depth, D:
D=d + board thickness

[4] Another (and last) simple calculation before you start to draw lines on your board. To allow for the thickness of the board when you fold it into the shape of the box, you need to add twice the board thickness to the length l, and to the width w. You need to add one board thickness to the depth d. Thus the final marking out dimensions are as shown above.

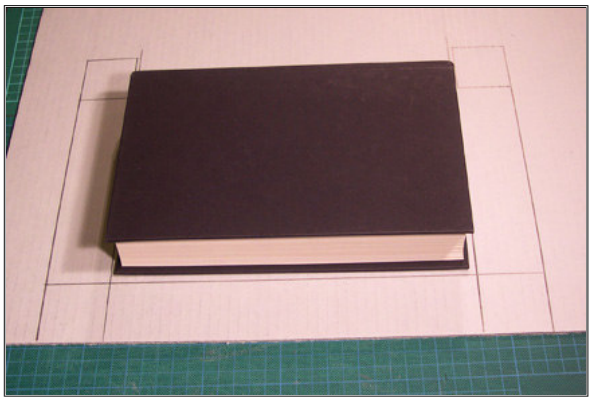
The material used to make the box is blue-grey archival corrugated cardboard. For most purposes the single-wall board is more than adequate. It is 3 mm thick and is available in sheets of several sizes. So using this board, you need to add 6 mm to l and w, and 3 mm to d to give your marking out dimensions of L, W and D respectively.



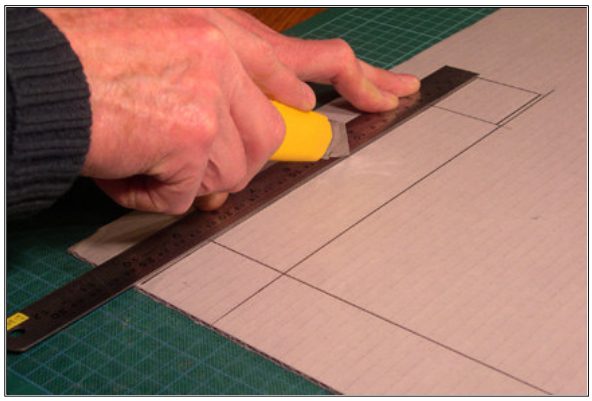
[5] This picture shows what the marked-out box should look like, ready for cutting and folding. The dimensions L, W and D are indicated. Note that 3 mm is trimmed off what will become the lower edge of each rear corner flap.



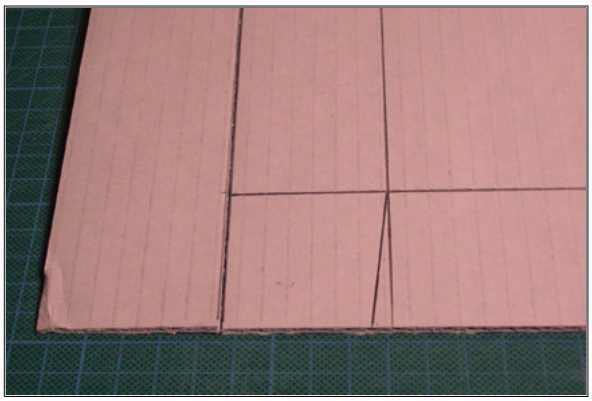
[6] Go ahead with marking out, using ruler, pencil and set-square. Note that your piece of board must be large enough to include the lid which will be attached to your box.



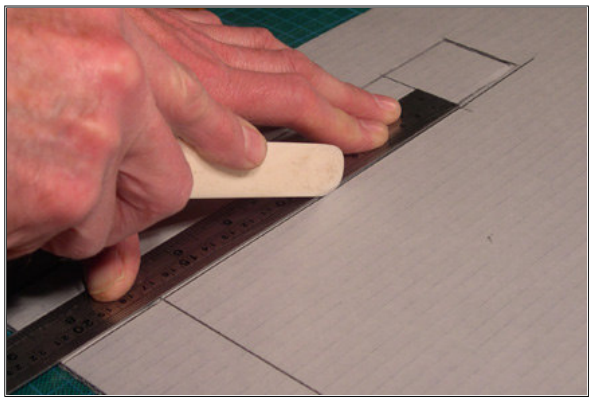
[7] Once you have marked out the box on the board, check that your object will fit inside the lines defining the bottom of the box. Do this BEFORE you start cutting! Always remember -- measure twice, cut once!



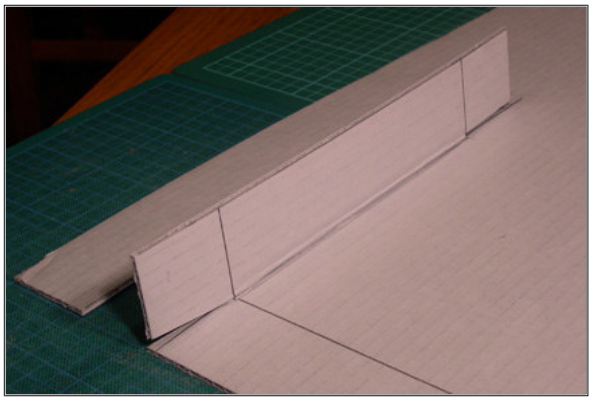
[8] Once you've checked the fit of your object, go ahead with cutting the outline of the marked-out box. Use a steel rule and a sharp knife - and make sure your fingers holding the rule stay well clear of the knife blade!



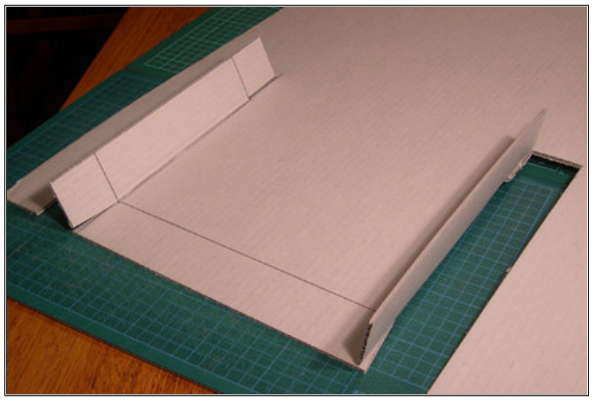
[9] Next we turn our attention to the front corners of the box. We want a flap at the front end of each side of the box which can be folded round the corner and glued to the front of the box. Start by marking a taper on the lower edge of one corner flap, as shown in the picture above. Here the outer end of the corner flap is tapered by 5 mm, but the amount of the taper is not critical. Cut the tapering edge of one flap. Repeat the process for the other corner flap.



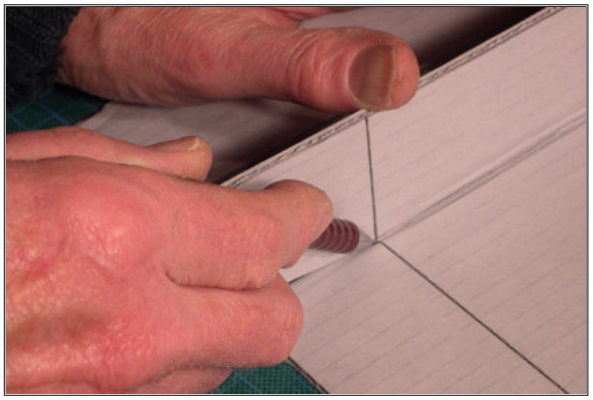
[10] Now you can start folding the box. Use a bone folder and a rule to score the line between the bottom of the box and one of the sides, as shown in the picture. Score the board firmly and quite deeply, without, of course, cutting it right through.



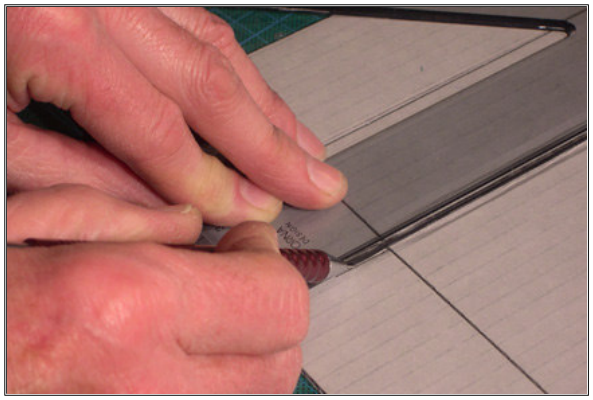
[11] Now fold up one side of the box as shown.



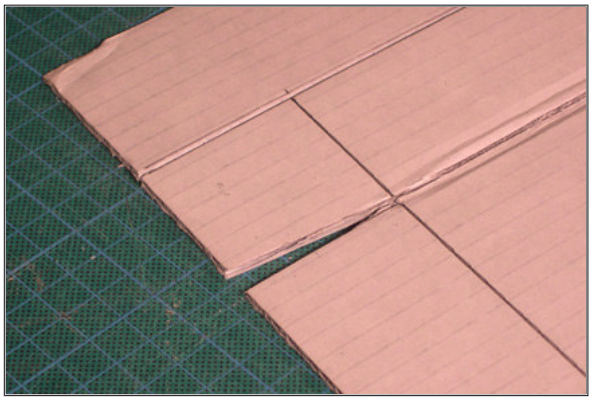
[12] Score and fold up the other side. Your box should now look something like the picture above.



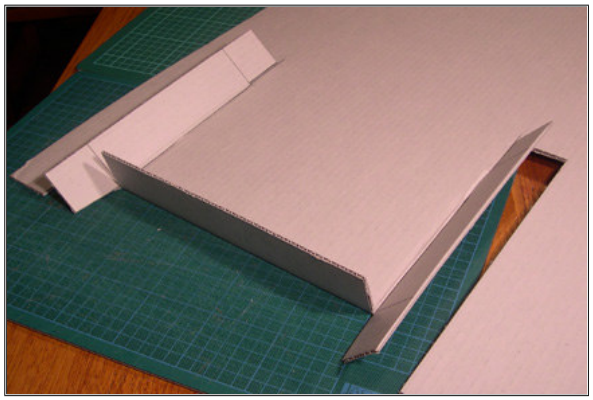
[13] Before folding up the box front it needs to be trimmed to fit properly between the box sides. With a side folded up and held in position, carefully mark on the box front the point directly below the inner surface of the box side, as shown above.



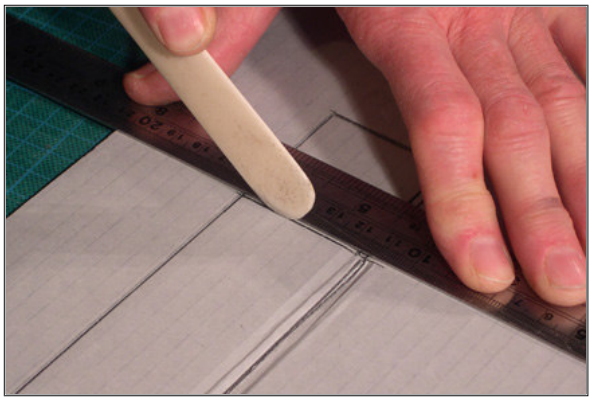
[14] Now draw a line perpendicular to the board edge and passing through the point you marked in step [13].



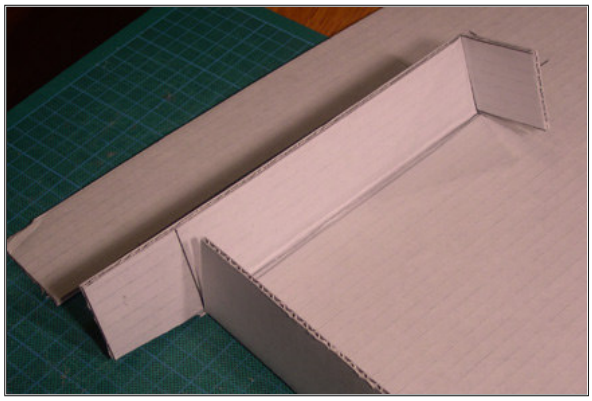
[15] Cut carefully along the line marked in step [16] using a steel rule as a guide. Remove the triangular piece of board to give the result shown above. (You will probably have to make a small additional cut at the apex of the triangle to free the piece of board). Repeat this process for the other corner.



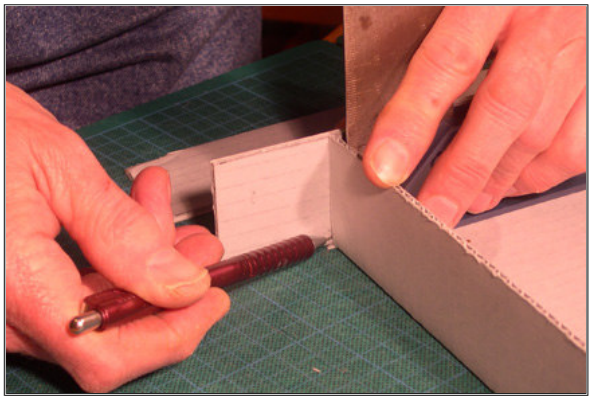
[16] You can now score the fold between the box bottom and box front, as you did with the sides, and fold up the front as shown.



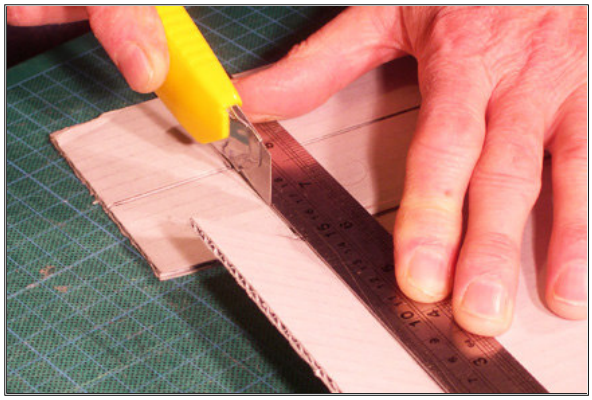
[17] Flatten out one side of the box again. Score the line marking the fold between the side and the rear corner flap. Fold the corner flap upwards, perpendicular to the box side.



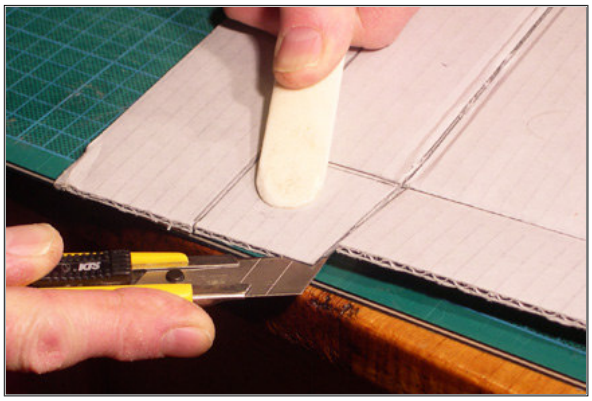
[18] Fold the side upwards again. The box should look something like the picture above. Repeat for the other rear corner flap.



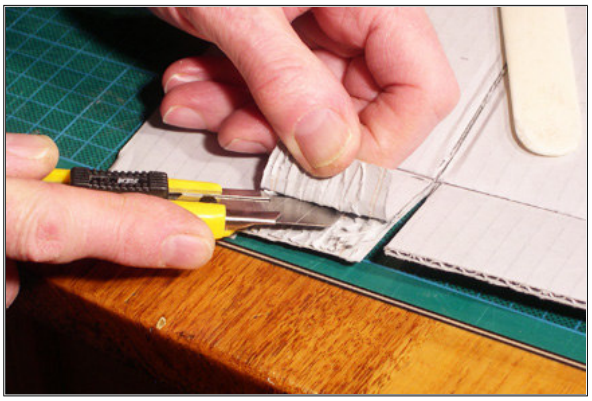
[19] Now to fold and glue the corners. The object here is to remove the inner wall and the corrugations of the front corner flap to leave only the outer wall to be folded around the corner and glued to the box front. To start, fold the box front up into position and hold the box side pressed against the front. The picture above should indicate the set-up. If you have enough fingers or can get some help, it is good to have a set-square or carpenter's square in position to ensure that the box front is perpendicular to the box bottom. When everything is in position, run the pencil along the edge of the box front to mark a line on the inside of the corner flap.



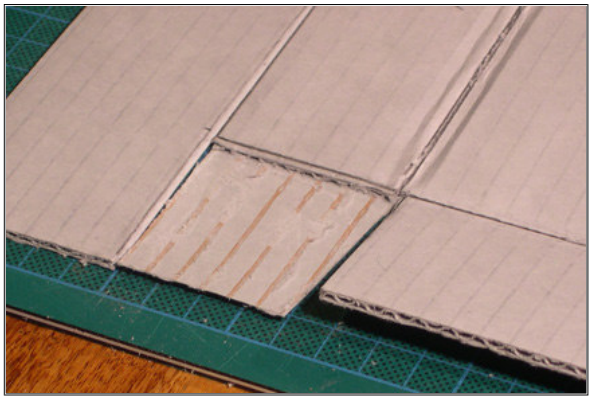
[20] Now for the tricky bit. Using the knife and steel rule, carefully cut along the line you've just marked on the inside of the corner flap.You want to cut through only the inner wall of the board so take it slowly.



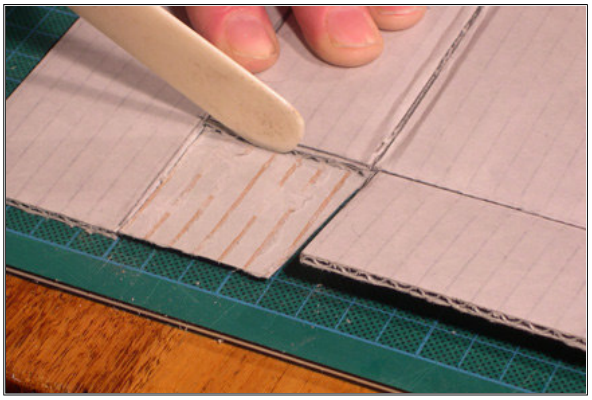
[21] Another tricky bit. Position the corner flap close to the edge of your table or bench. Hold the flap in position using the bone folder, as in the picture above. With the knife, begin to split the flap by cutting through the corrugations between the inner and outer walls. Be very careful to keep your fingers well away in case the knife slips. As you cut through the corrugations you will be able to peel back the inner wall. (NOTE: You might like to practice this splitting process on some scrap before tackling the corner flap.)



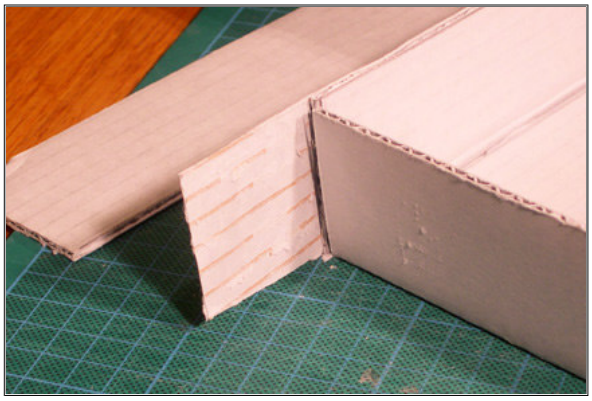
[22] Here the splitting has progressed. The inner surface of the remaining wall of the corner flap can be cleaned up by gently scraping with the knife blade to remove traces of the corrugations.



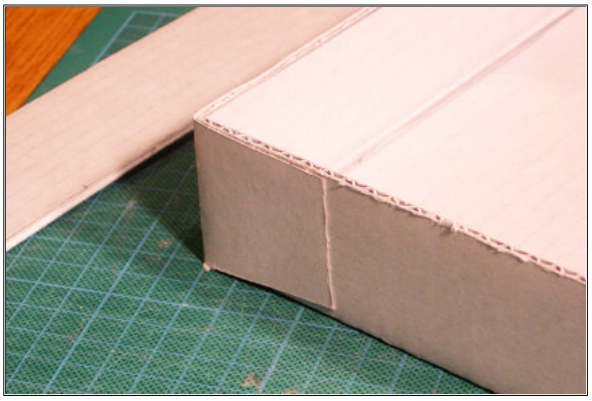
[23] After cleaning the flap should look something like this.



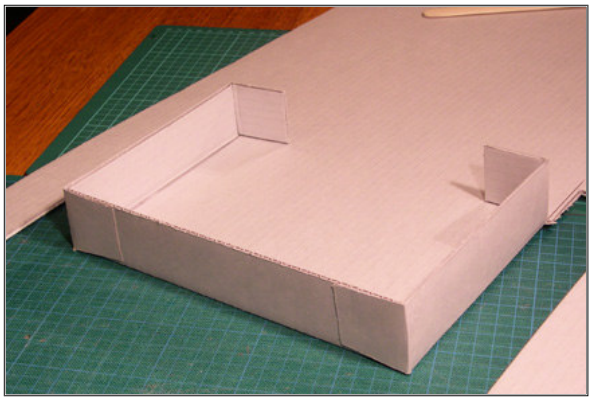
[24] Next, lightly score the flap along the line where it meets the box side, as shown.



[25] With the box side and box front raised to their correct positions fold the corner flap on to the box front. Glue it in place using PVA adhesive or hot glue.

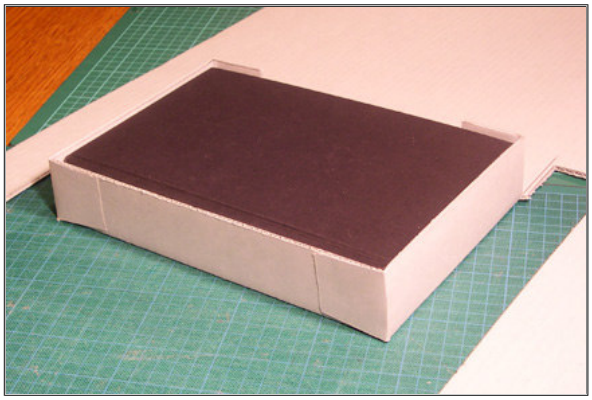


[26] The completed corner should look like this. Repeat the process for the other front corner.

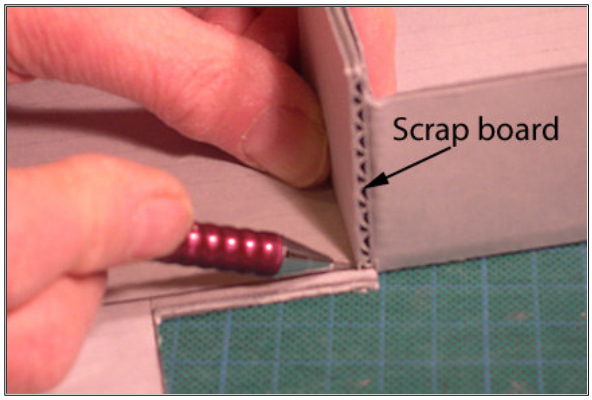


[27] This is the completed basic box.

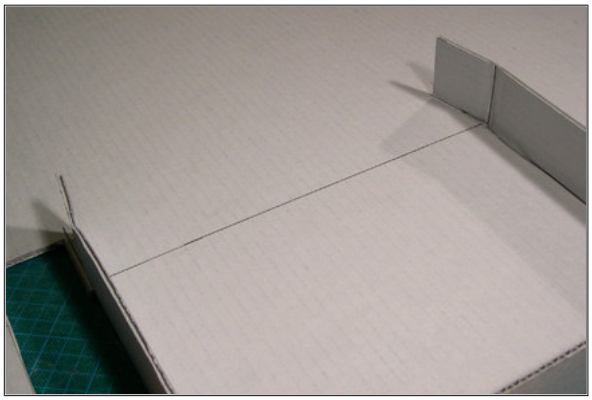
[28] Now the acid test . Check to see if your object fits in the box.



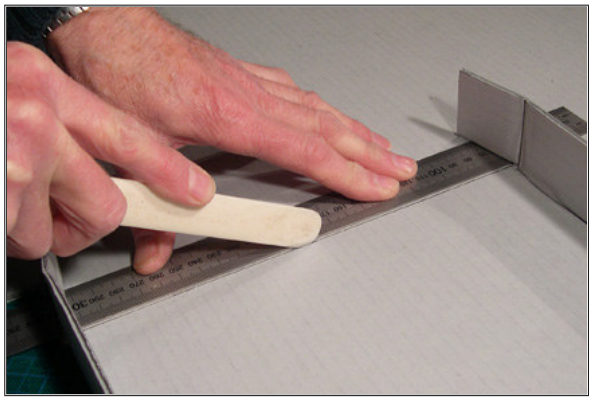
[29] Success!



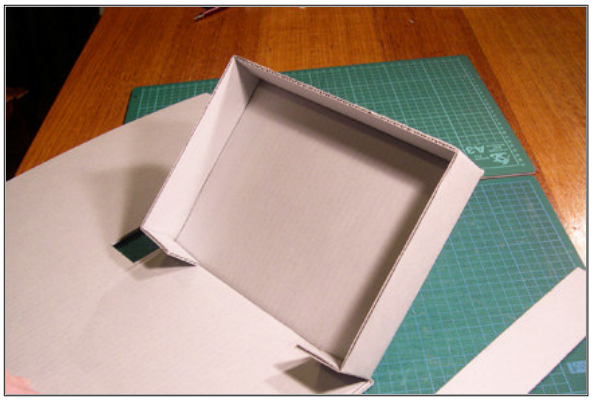
[30] Now for the lid. With one of the rear corner flaps positioned at right angles to the box side, hold a piece of scrap board against the flap and make a pencil mark along the base of the scrap board. Repeat for the other side of the box.



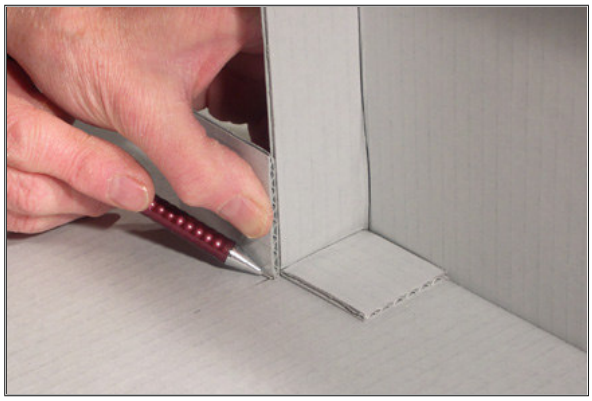
[31] Rule a line between the two marks made in the previous step. This line marks the fold between the bottom of the box and the back of the box, as shown above.



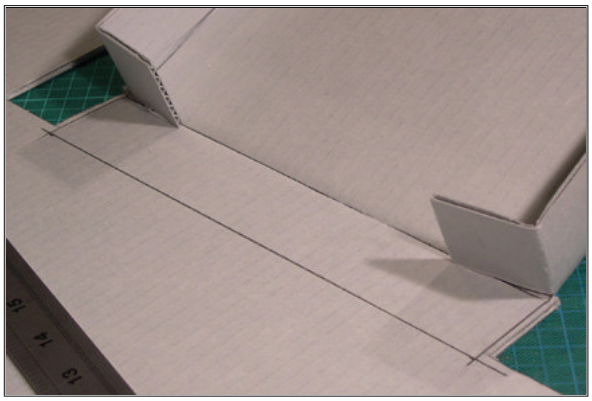
[32] Use the bone folder to score the line drawn in the previous step.



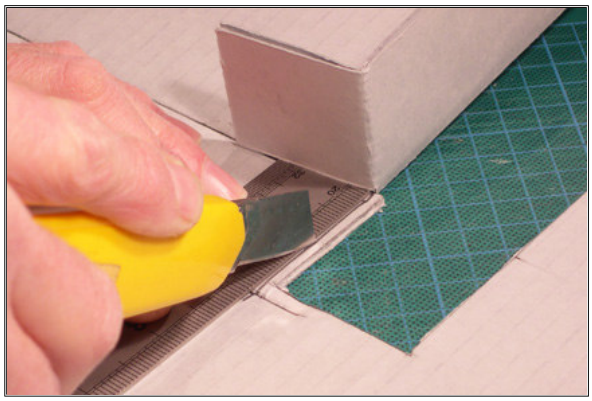
[33] Fold the box upwards along the scored line as shown above.



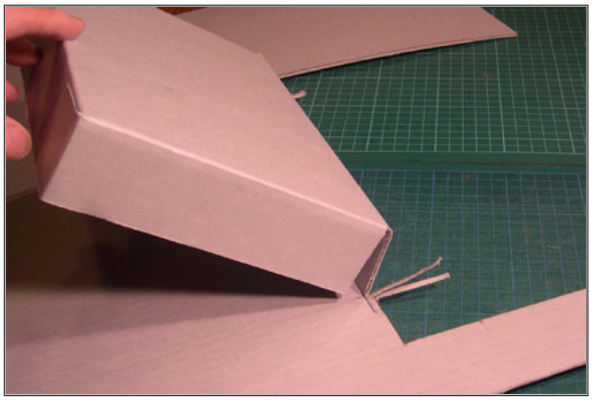
[34] With the box raised until the rear corner flaps are flat against the back of the box, position a piece of scrap board against the box side as shown above and make a pencil mark at the base of the scrap board. Repeat for the other side of the box.



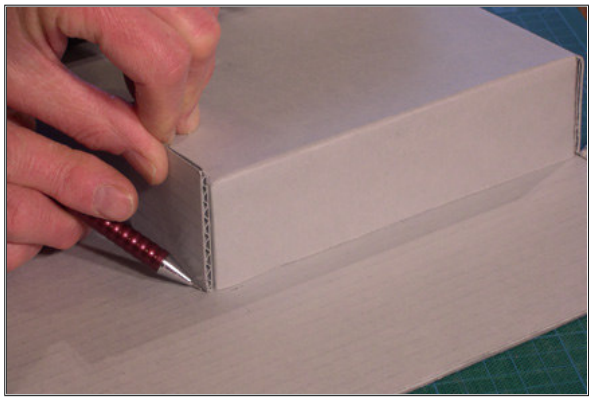
[35] Rule a line between the two marks made in the previous step. This line marks the fold between the back of the box and the top of the lid, as shown above.



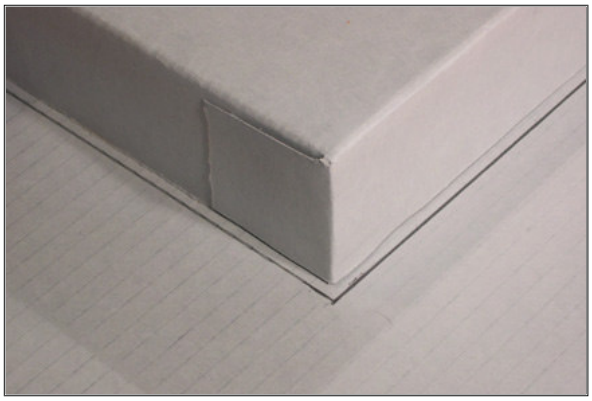
[36] Now trim the ends of the back of the box as shown above. Do not extend the cut past the line drawn in the previous step.



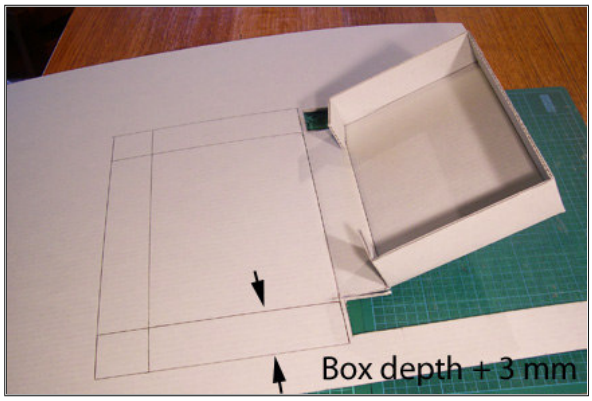
[37] Score the fold between the back of the box and the top of the lid. Fold the box over and down on to the board as shown in the picture.



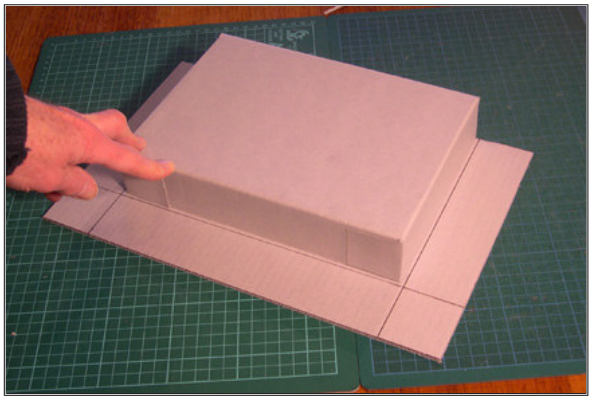
[38] With the box pushed firmly against the back of the box use a piece of scrap board as a spacer to mark points a board thickness away from the front and sides of the box.



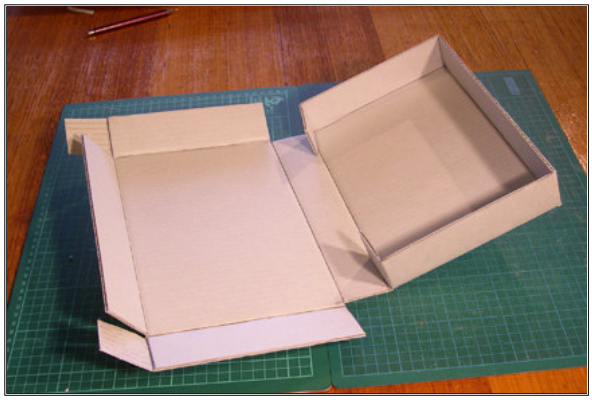
[39] Draw a line between the marks made in the previous step. The result should look something like the picture above.



[40] Now fold the box back out of the way and mark out the lid using ruler and set-aquare, just as you did for the original box. In this case, the depth of the lid is equal to the measured depth of the box plus 3 mm.

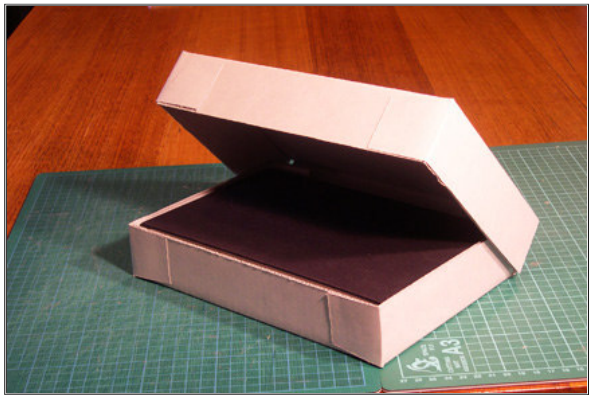


[41] Cut round the outline of the lid and do a final check of the fit of the lid and box as shown above.

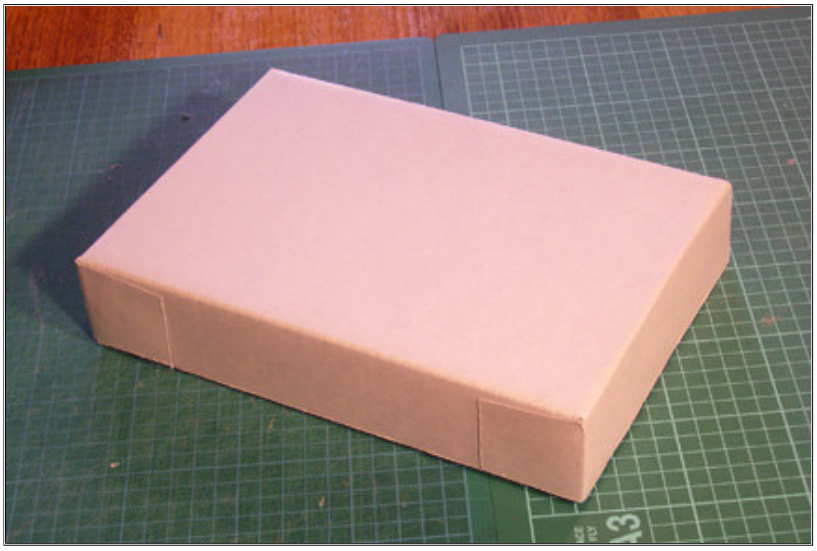


[42] Go ahead and cut and fold the lid and its corner flaps just as you did for the box itself. The result should be something like that shown in the picture above.

[43] Glue the front corner flaps into position and position your object in the box.



[44] Fingers crossed! A final check of the fit of the lid.



The final product, with closed lid.