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Making the clay sculpture

The first step before I start a sculpture is to decide on the size; I chose to do a rather [larger] than life size version of the Velociraptor head so that I could go into proper detail with features, such as the eyes and teeth.

The Velociraptor was only the height of a small turkey in real life so the sculpted head is much larger than the real head. The next step is to make the armature; with some sculptures a wrapped internal fitting of newspaper is used, to give the sculpture a solid structure and to make the final stage of hollowing out easier.

The Velociraptor head is supported, during the sculpting process, by a metal pole, which forms the neck and two thin lengths of wire covered in wrapped newspaper for the mouth, as the jaws would sag with no support.

During the first week a thin layer of clay, at least one centimetre thick, is put on top of the armature, as this is the thickness used for firing the clay. The shape of the head can then be roughed out - more clay on the thick upper jaw, a round ball for the back of the head and a certain thickness all around for the neck.

I also decided that I would not add the feathers as the primary evidence for feathers was on the arms of Velociraptor, not the head, and the texture would have made them extremely delicate and easy to snap.

The next couple of weeks are used refining the clay and roughing out the shapes. I find I work more easily when the clay is smoothed out and I can more easily see the flaws in the structure.

As I have never made a skull before, the Velociraptor head is a particularly important step for me; the thin cheek bones and the sheer smoothness of the bone in the eye sockets both combined to make the skull side particularly fragile.

For the flesh side of the head I mainly add on clay, for the skull side I remove clay and cut holes; it is rather like a process of excavation in itself, creating the skull, as I have to work carefully around delicate thin bones and remove excess clay, as a palaeontologist might remove dirt from a skeleton.

The eye is a particularly difficult aspect, as I need to decide whether the middle of the eye is raised or whether the “white” is raised and the middle cut away to create a dark hollow. I decided that for this sculpture, although I have used the latter technique on other sculptures, it would make the dinosaur

appear more realistic if I used the first technique.

A particularly difficult part of the sculpture was deciding on the type of divide between the flesh side and the skull side of the head, whether it would be a definite line or a more gentle, sloping divide. I chose to have a definite line, as when I tried the latter of the techniques the head looked crooked and wrong.

I had to make constant guesses about what level to build the skin on in relation to the skull, as I soon realised, by comparing images of the skull and the reconstruction, that there was a thick build-up of muscle and flesh in comparison to the skull and that some of the lines - e.g the straight line of the reconstruction and the sloping line of the skull - didn't follow each other as much as I had previously thought.

The skeletal jaw is relatively straight, but the reconstruction shows rather a crooked angle to the jaw, making the mouth particularly difficult. Before I made the teeth I realised that they were actually quite small and delicate, making the job of creating them much harder; for my other prehistoric creature - the Dunkleosteus - the teeth were a large and distinctive shape and were designed to fill up the mouth.

The Velociraptor's teeth were rather similar to a crocodile's teeth, gradually becoming larger as the rows reached the front of the mouth.

The third week is taken up refining the features of the skull. I had to remove at least a quarter of the clay that I originally placed on the sculpture during the creation of the neck.

The place at which the bones of the spine connect with the back of the skull is very deep down within the Velociraptor's neck, so a great deal of carving was needed to create the individual vertebrae.

The position of a Velociraptor skeleton fossil which I worked from during the creating of the skull and spine showed the fossil still half embedded in the clay where it was being excavated, so I attempted to achieve a similar effect with my Velociraptor head - the vertebrae are left half uncovered - showing a cross section into the neck and also putting me in mind of a half-excavated skeletal fossil.

Even though I had seen images of the size of the spinal vertebrae before, sculpting them made me realise just how small they were in proportion to the rest of the dinosaur; the amount of muscle and flesh, not to mention the weight of the

skull, resting on the tiny vertebrae showed how well-designed these creatures were, even though they were not particularly large or wide, the pattern of the vertebrae was very flexible, allowing the Velociraptor to make the extremely fast movements for which it is known.

During December, when I brought the sculpture home to work on, I worked first on the skeletal side of the head. Owing to the delicate vertebrae I had to add a thin layer of clay over the blank hollow near the vertebrae, to stabilize it.

Texturing the sculpture was difficult, the imprints around the mouth were made with wire; I had to alter the wire in respect to different dimensions of the scales around the mouth. I have also attempted to create the Velociraptor's tongue in the flesh side of the face to make the Velociraptor seem more realistic. I decided to leave the teeth until I had taken the sculpture back as the Velociraptor has extremely small and delicate teeth - which would be easily broken and dry out quickly.

Texturing the skin was made even more difficult due to a dent in the side of the Velociraptor's jaw so more time was taken up adding clay to the right extent and changing the thickness of the jaw.

The texture was made by using thin beading wire to cut creases into the Velociraptor's neck and the more delicate impressions on the face were made by imprinting woven straw into the clay - which was especially difficult as the face was already drying out somewhat - as it needs to get to the right level of hardness before the rubber is added - and thumb impressions had to be covered up from when I pushed the straw into the side of the face.

Casting the sculpture

After final adjustments and additions - such as the teeth - the first layer of rubber was put on; the mixture was painted onto every inch of the clay so that there were no holes left for the moisture holding the sculpture together to escape. The rubber was difficult to paint on as it was a particularly thick rubber mixture and dripped all over the workspace and the stand - luckily it was easy to remove once it had set.

The next step in the process was cutting pieces of plastic surround to fit around the outline of the head - so when the mould was complete it would be easy to divide the head into manageable sections to pour the bronze resin into. The cutting of the plastic was difficult owing to the jagged outline of the head - particularly the interior of the mouth. The plastic is cut so that it covers the whole outline of the head and then the slightly overlapping edges are taped together to hold them in place.

Another thicker layer of rubber is then given to covering the plastic surround so that the entire sculpture is covered in rubber and so that no air holes remain for the sculpture to dry out from.

During the next two sessions, more coats of rubber are added onto the sculpture and sandwiched between them is a layer of fibreglass mesh put in position to hold the overall structure in a prevent too much rubber running off.

During the next week, another much thicker layer of rubber was added to be spread into the hollows - such as below the jaw and the areas behind the vertebrae - and then cushion wool was added to all areas behind the skull section. The wool stuck to the already wet rubber surround and was then in turn fenced in by the fibreglass mesh which was placed over the top; the whole area was then coated in rubber solution.

Finally “buttons” were added to secure the cast for the next layer and the whole area was smoothed over using the hands and fairy washing up liquid which acted as a barrier between my hands and the (extremely) sticky rubber and allowed it to be smoothed out more easily.

The next couple of weeks were taken up making the hard casing to go around the rubber mould. The casing is formed of layers of fibreglass interspersed with heavy plaster material; once the outer casing was complete the sculpture was drilled through with holes to put the screws into - which hold it in place once the resin is added.

The casing is then opened and the clay sculpture is removed; my original head was partially damaged by its removal and had lost part of its jaw, although it was in a repairable state.

Once the clay head was removed, the rubber mould was washed, dried and then dusted down with bronze dust - which gives it its shiny quality when cast - and then the first layer of resin is “painted” into the mould. The first layer is made from resin, bronze powder, copper powder and a hardener.

The first layer then dries and the thicker, second layer - formed from slate power instead of bronze powder - is added which fills up all the detail.

Finally the fibreglass is added and, once the layers are completely dry, a thin piping bag of resin is squirted around the outside edge of each profile of the mould. The sides are then connected before this has set, to bind it together; the bolts are then screwed in and the sculpture is left to set for a while.

Once the sculpture has finished drying out, the mould is then removed and the cast sculpture emerges.

It took around 30 minutes for my sculpture tutor to wrench the rubber sheet through the small gap in the Velociraptor's jaw, but eventually the cast came fully out.

Once the sculpture is removed from the mould, milliput is added to any faults or air bubbles visible in the resin and then the milliput (when dry) is coated with resin to blend in with the rest of the sculpture. After the sculpture is a uniform colour, it is rubbed using wire wool to bring out the shine in the bronze resin.

The next session is spent drilling the sculpture into the block of wood made as a stand and then painting it with effect it will retain when finished. The head simply needs to be left to dry out after that and then fully attached to the base. After that the sculpture is finished.