I made no sketches, no models, no engineering drawings... I sculpted the production moulds directly, using my own blends of resins, fillers and metal dusts... The production moulds were the sculptures... they were positives, negatives and reverse engineered. They incorporated undercuts and tumblehomes and produced a moulded finished article that caught the highlights and shadows of an organically formed being. It wrapped around the body as if it had grown.

My efforts were accepted and admired. I willingly gave Star Wars productions Ltd. the prodject on a plate. Given that the character was the "Useful Artical" from which the film could be made ,it is not surprising that I was given a free hand in creating many of the other characters.

After I made the initial Stormtrooper helmets for my artist friend i was in troduced to John Mollo, who was the costume designer for the movie. John was an excellent communicator. We had an empathy and understanding of what was required, and he used every character I gave him.

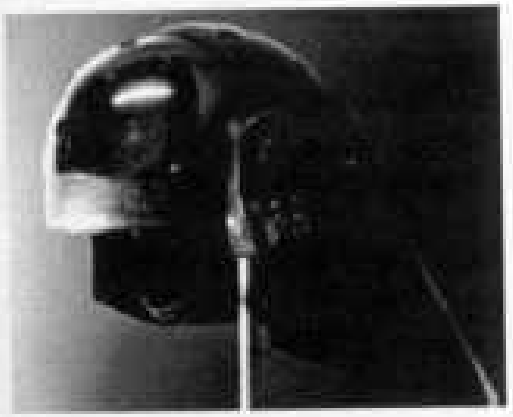
5. What actual moulds were leftover from Star Wars ?
While at Shepperton Studios I meticulously kept all moulds on racks in an organised manner and all with protective skins moulded and left on them until further use. We used to sell the same props, or derivatives of, several times over, as new production companies came and went. This was standard practice at all studios and in fact the 'prop stores' are without a doubt the most fascinating insight into movie history. The word 'prop' means property. The items we retained from film productions were our property and it was our business to reinvent them or sell them again for the production of lesser movies or maybe ads. I remember one quite splendid helmet that I created for 'Outland', it not only appeared in another four movies but ended up as the main feature in a British Airways advert.

After finishing with the film business and requiring valuable space, I decided one day in the early eighties to have a clear out. Out went the Stormtrooper armour moulds, but I kept the protective skins for reference, and I also kept the moulds for the helmets, as they were better made , in pretty good condition and possibly one day may have a use.

6. Are the helmets from the original moulds?
Yes they certainly are...except for the Stormtrooper Battle Spec, which is CNC machined and a very good reproduction. Even I have capituiated and have started to use computers.

7. Who actually makes your current production of helmets?
I make the hand made ones from the original moulds and I get help with the Battle Specs.

8. Debate over the rear swoop of the helmet and undercut under 'v-coder'
My original concept was to make the character without joints and to be as organically grown as possible. To achieve this all mouldings had to be undercut and blend into the next. With the Stormtrooper helmet, I had conceived to make it by rotational moulding, that is in a split female mould using PVC or PU polyols. Considering that the development budget was zero, my ambitions were curtailed into practicalities and so I looked around the workshop to find an alternative and something that would suffice as a prototype.



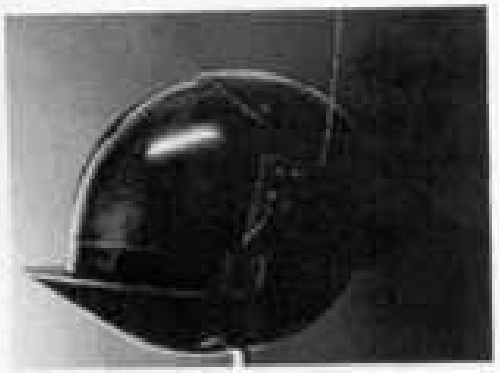
'Fishponds' ...that was the answer. I was running a nice line in fishponds and rock cascades, made from HDPE, a tough flexible material in a beautiful' gungy ' green. I manufactured these fishponds from sheet material 1.5mm thick, heated to a semi molten state and sucked with vacuum over a male mould. The material is a "pig" to mould, and really needs something as rough as the texture on a rock cascade to stop the moulded item shrinking back to its preformed shape. Its advantages were that it would form well in undercuts and was tough enough to spring off overcentre moulds without cracking.

Knowing the exact parameters of this materials moulding characteristics, I set about sculpting a Stormtrooper head mould incorporating the absolute

maximum undercuts and tumblehomes that I reckoned I could mould the HDPE material around and still achieve a release. This is where the mould making material I used came into thier own. By slowly increasing the undercuts on the sculpted head and trial running the mouldings, I eventually arrived at the maximum undercuts I could achieve. This method of trial and error, contributed significantly to determining the final shape of the head, and at the end of the day, although not quite as originally conceived, it was a pretty good effort.

At this point I had proved to myself that a reasonable undercut could be achieved...but it was a vacuum formed piece and as such only part of an all enveloping structure. To make a complete head I was going to have to mate a few moulding together. If this was going to look any good at all, I would have to be clever on how I disguised the joints...It could not look fabricated...that would really defeat the object of the exercise.

I ended up making the head from five mouldings. Each one incorporating the maximum undercuts for that particular moulding and each one overlapping the other on sympathetic lines that disguised the joints. It gave the overall appearance of homogeneous, organically grown being. Splitting the sculpted moulds up like this also gave me the facility to enhance certain aspects and characteristics. For example: the ears which hid the vertical joint on the side of the head could also be used to widen the head and increase the intimidating presence of the being , such as can found in a lion's main or aggressive lizard. The eyes, like a fly's eye could be made to see in all directions, hence the 'blister eyes' and again adding to the intimidating features of the character. Features



like these allowed me to fine tune the character and hence the first prototype that I presented was eagerly accepted. A request for 50 heads soon followed.

This was fine, but I had presented a prototype that was made from a totally unsuitable material and a material that was not really viable for reproducing in a larger quantity than one. However I persevered and made several more helmets in the green HDPE. The front face of the character held up reasonably well on shrinkage, but the looser back part was susceptible to severe distortion, and every helmet I made ended up a different distorted shape in this area. In actual fact I had overcome this previously with a cunning trick of moulding, but the budget restraints led me to abandon it. I had incorporated a serrated flexible hose as an insert around the back of the head, moulded over it and completely encapsulating it. Upon release the moulding brought the flexible hose with it and "hey presto" a beautiful undercut with minimum distortion.

It obviously was not viable to continue using the fish pond material and the minimum quantity of bespoke material that I could get made was one ton. Well, a ton of plastic at 1.5 mm thick makes a hell of a lot of mouldings.

My knowledge extended to other thermoplastic materials and I opted for ABS with a high content of butadiene.This formulation offered good impact strength with an adequate degree of flexibility that would allow an actor to perform in the armour and also allow me to manipulate reasonable undercuts from the moulded material at 1.5mm thick.

It was also chemically weldable, which was a fundamental requirement if the required effect was to be achieved.

Colour....well 30 years ago thermoplastic extruders were not thick on the ground. Materials were used for mainly engineering applications and so available colours were limited. At a minimum extruded quantity of 1 ton my options were black, grey or white...

My risk was to be left with the material if the job went pear shape, plus I had 2/3 ton to absorb into my stock that I would have to find a use for. I chose white as the most useful colour and that is why the Stormtroopers are all white as also are the X wing pilots. Other characters that I made were black and grey and in 3mm thick material, this was more of a stock item and easier to source.

9. Origination of the current armour moulds...

As mentioned previously, we threw out the armour moulds in the early eighties but kept the protective mouldings. I have bags and bags full of these from all different films. They are in storage in a warehouse in Northumberland and just part of our prop store. I have used these as references and re-sculpted the rest. The real information is still in my head and like a computer I can download from my hardrive any time. I am quite satisfied that what I have achieved is a very good effort and as near as possible to the originals. In fact they are probably better.

10. Plans for the future.

I will re-introduce all the characters I originally made for Star Wars ,and Sheperton Design Studios will re-discover itself and offer its professional services for prop making to the film industry and the rest of the world.

We don't make replicas ,we make the real thing...

HISTORY - interview with Andrew Ainsworth

1. How did you originally get involved in Star Wars in 1976?

I was a young product designer just out of Art School in London, venturing into producing my first designed product and convinced that it was going to seriously change the course of history.... "A sports car" ... I had always lusted for a Ferrari Dino, but student income never quite stretched that far. I had been working on the product for a couple of years or so and managed to get the production numbers up to 50 odd units, subsidizing the project with odd jobs and other work. In fact I think I was better at the other work than making the cars, and became quite an expert in manipulating composite materials of all kinds, including designing and building the plant and machinery to process it. My company was called Shepperton Design Studios, and I operated out of a 1,000 year old farm house in Shepperton, just by the Film Studios.

As the old farmhouse caught fire one day, I moved back into London, an area called Twickenham, which was littered with artisans, rock groups, intelligent litery people and generally a most agreeable place to be, cosseted by the meandering river Thames. Several film and TV studios were also located there and it was not long before my reputation for creating real and interesting items became known. I had built a 15ft long vacuum forming machine in the front of a Victorian sweet shop on Twickenham Green, just 6 ft from the pavement.:... we had to knock out the front of the shop to let the heat out and likewise all the moulded component parts were just left out on the pavement to cool down... .. All sorts of stuff spewed out of that