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# Parametric Flesh: an artifact of a collaborative process, moving bodies and a digital 3D scanner.

by Boo Chapple and Inger Mewburn



*This paper is concerned with a collaborative project entitled Parametric Flesh, that was carried out in 2003 at the Spatial Information Architecture Laboratory (SIAL) at RMIT University. In this work we used a hand held 3-D laser scanner to investigate the formal possibilities of the intersection between living, moving bodies and digital imaging technology. These experiments with the 3-D scanner resulted in a set of images of our own bodies which were collaged together in various strange and monstrous combinations. Here we will discuss how this project demonstrates the possibilities of embracing the unintended artifacts of the process of making art work, and architecture, with digital technology.*

*As a joint effort this project was able to hold two different research agendas in a healthy tension; both of us wrote about the outcomes in quite different ways in our respective masters theses. When we came to write about it collaboratively we realised that where we share the most common ground is in the investigation of 'artifactness'. By this we mean that we were both interested in how to bring the accidental and unintended combinations and ruptures, the artifacts of the process of creation, to the fore in the act of generating a cultural artifact. In doing this we intended to highlight the contextual and contingent aspects of making art work which are, in the final product, so often ignored, or smoothed over, or 'made good'. In short we wanted to reassert the artifactual nature of the artifact. Similarly, you will find that this paper is presented in such a way as to draw attention to the process by which it has been written. This will take the form of a written conversation between us. In doing this, we hope that the gaps and discontinuities between what we both have to say, and between our different reconstructions of the project, are made manifest. We begin, as all good academic papers must, with defining our terms. Here the key term is obviously 'artifact', but both of us bring a disciplinary perspective to this definition:*

## **Artifact Defined**

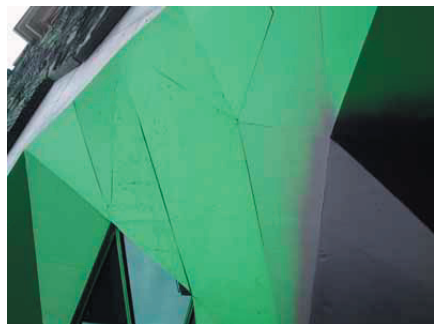
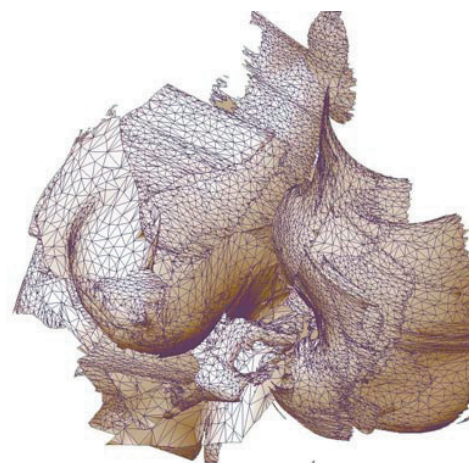
**Boo says:** The term artifact traditionally has two meanings: firstly, it is an object made by humans that often has some cultural or historical significance attached to it; secondly, it can be defined as the unintended result of a transductive process, where, in the course of transformation across physical states (transduction), a residue particular to the nature of this transformation is created. For example, pixilation in digital images is an artifact of the way in which a continuous domain of light is encoded in discrete units of binary code. Importantly, in the terms of both these definitions, an artifact allows us to discern something about the process (physical and cultural, historical and technological) that created it. An artifact attests to the fact that information is never context free and is always processual in nature. It mediates between the forces at work in the process of its creation and the situation in which it is encountered. In fact, the etymological basis of the word is that of joining – coming from the Latin "ars... orig[inally] skill in joining or fitting" and "factum to make". (Ultralingua 4.2). An artifact joins together: temporal domains, such as a particular historical era with the contemporary one; spatial domains, such

as the space in which the light hit the lens with the space of the computer hard drive, or indeed the topological configuration of the artifact itself configures space in particular ways; actions, such as the actions of a person involved in its creation with those of a person who encounters it; physical states, such as light with the electrical impulses of digital code; and economic transactions, such as those between artisan and patron, laborer and consumer. An artifact is a particular density or moment in the flow of things, through which the nature of these things, and their relations, can be glimpsed.

As this definition would indicate, the act of creating an artifact involves constructing relations between different domains; spatio-temporal, physical, economic, etc. In *Parametric Flesh* Inger and I were concerned, not only with investigating and highlighting the artifacts of the relationship between 3D scanner, moving body and computer, but also with reflexively investigating the act of creation as an artifactual process. We were interested in opening up a particular situation and culture of production through our actions with the scanner in order to question some of the normative, mimetic practices of digital representation - the habitual joining together of domains in particular ways. Thus, *Parametric Flesh* is as much an artifact of the intersection of Inger's and my own concerns with the culture of the architecture laboratory in which we were working, as an artifact of the process by which angles of incidence and reflection of a laser beam are interfaced with a computer to construct a three dimensional representation.

**Inger says:** Although Boo's definition shows us how building can be considered to be artifacts most architects would struggle with this concept; I think this has something to do with scale. The common usage of the word 'artifact' tends to imply smallness - a spearhead found at an archaeological site is more likely to be considered an artifact than the remains of the building in which it was found.

The term artifact is most often encountered by architects when they are working with digital technology. These sort of artifacts are considered to be 'mistakes' produced in digital processes; the unintended result of the operation of the machine that leaves its marks in the images that are produced. One example of the artifact peculiar to architectural practice is the tessellations that are shown on the surfaces of 3-D digital objects. The word tessellation is derived from the process of mosaic tiling where small pieces of glass or tile are joined together over 2-D or 3-D surfaces to create images. In 3-D computer models the maker has limited control over the form of the tessellations; many people consider them to be ugly or pointless and they are generally made to disappear in the final images. However more 'avant garde' practitioners, and in this I include many architectural students, will tend to emphasise them in a way that has become, over the years, a recognisable style. I assume that part of the reason they practice this style of image making, which I might call 'techno-fetish', is to assert the presence of digital technology in the process of making. But the tessellations on these 'techno-fetish' images are usually suspiciously neat and tidy - quite unlike the messy job that the computer will do when left to its own devices. This cleanliness signals that there has been some unacknowledged interference by the maker in an image that presents itself as 'raw'.

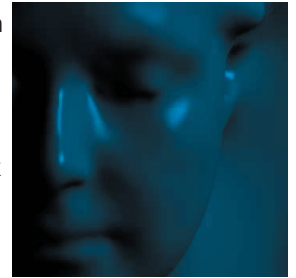


If they have trouble surviving the image making process, it is even more unlikely that digital artifacts will find their way into the architect's buildings. But one possible exception is the Australian architect Howard Raggatt. The surface and form of the large overhanging entry of the Storey Hall project at RMIT was designed and modelled with the release of AutoCAD current in 1994. Raggatt used a 'Boolean Operation', where one geometric form can be subtracted from another, to create the cave like form for this entry. This was a technique notorious in this particular release of AutoCAD for taking a long time and creating uneven looking meshes. Even successful Boolean operations

often yielded results that looked rough and messy. Occasionally a Boolean operation would 'break' geometry altogether by causing its geometrical description to become imprecise. The computer still attempted to display the results of these imperfect geometrical operations, which resulted in strange visual artefacts appearing on the screen. This digitised struggle to be born seems to be literally expressed in the detailing of the concrete form of

the Storey Hall entry overhang. Some of the rough cast edges between the slabs are barely smoothed over, others disappear altogether, so that the 'seams' start to become uncertain. The remainders of the casting lugs left in the slabs bear witness to the difficulty of both the digital and the physical process of making such a complicated form. The artifacts, by allowing us to discern something of the nature of the process of making, demonstrate the potential of embracing 'mistakes' and making them manifest through the materiality of the building itself.

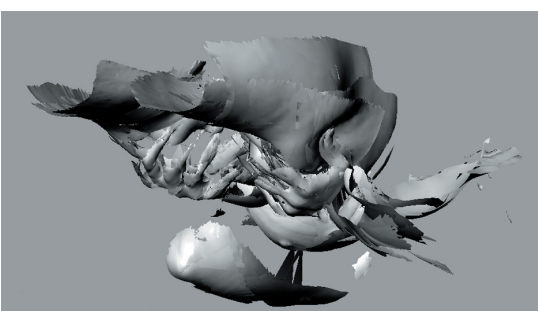
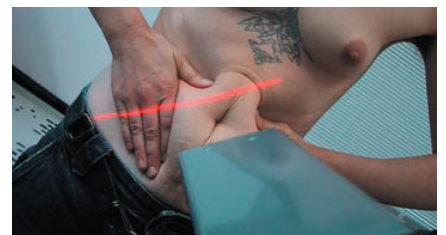
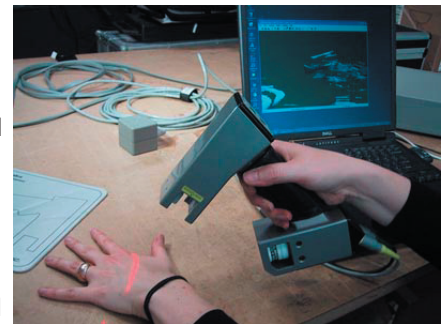
It was while I was studying this building, in late 2003, that we<sup>1</sup> had our heads scanned with the 3D digital scanner owned by SIAL. We were captivated by the type of imperfections that resulted from the slightest flickers or blinks of the eye; minute movements which produced a pock-marked effect across the whole of the mesh. The only way the operator<sup>2</sup> could get an almost 'clean' scan of my head to start working on was to instruct me to 'think like a statue' — the result, relatively free of artifacts, was disturbingly like a death mask. It was from this moment that, for me, the inspiration to work productively with the artifact began.



## **Performing the Scan**

*The self-reflexive focus on the act of creation in the Parametric Flesh project means that the event of making is an important part of the work. Our bodies are not only represented in the final scan but, in the tradition of performance art, our bodies in the act of scanning, in the process of editing the scans, are the site of the work itself. The affective quality of the visual artifacts, that were created as a result of this 'performance of the artifactual process', join together an audience outside the space and time of the scanning with the event.*

**Boo says:** In order to disrupt the traditional methods of constructing verisimilitude with the scanner and bring the ruptures and disjunctions of the process to the fore, we first set about investigating the actions required to create a 'realistic image' or 'good scan'. We had to learn the protocols involved in 'smoothing over', to learn to move with the scanner in a manner that highlighted certain relationships while obscuring others. We had to anticipate the surface that we wanted to create by tracing it with the movement of the scanning arm, to visualise the surface in order to bring it into being. Slow steady strokes were needed to produce an even surface. You could almost feel the digital clay, as it were, beneath the palette knife. Deviation from these protocols regulating the relationship between scanner and object created a 'misrepresentative' surface. In turn the object being scanned had to perform its static status as 'object' for the scan 'to work'. Thus, when scanning a living breathing body, a continuous outline is constructed as a performed relation between the scanner and the person being scanned. The body must limit the spatial extent and speed of its movement in order to intersect with the laser beam at the same point at each subsequent moment, the movement of the scanner must reinforce the same shape in each subsequent pass of the beam. It is a representative contract in which performer and witness, the scanner and the person being scanned, agree to ignore the discontinuous multiplicity of moving phenomena intersecting with a constantly shifting body-space-time.



The most important aspect of this project for me was to investigate how the living, moving body, with its open ended potential, could leave its trace in the discrete and finite process of digital representation. I did not want to create a static impression of 'the body' but rather a particular and contingent expression of an embodied moment. This meant that the relationship between the scanner and our bodies had to be performed differently. In order to allow the motive fluctuations of a live body to manifest themselves in the final scan, Inger and I misused the scanner. We were haphazard and slap dash. We made little or no attempt to perform stillness

with our bodies. We grabbed handfuls of flesh and squeezed them into excessive mounds. The resulting scans, the artifacts of this performance event, were layered fragments of body and motion, fractured with spatial discontinuities and duplications. They were not a realist obfuscation of their own process, but the woven texture of a body breathing with light; a moment captured from irreverently quivering process of life, exhibiting the iterative rhythm of the scanner's pass vibrating against the rhythm of a belly laugh, shuddering through breasts and backside.

**Inger Says:** When we took to the lab and took off our clothes to begin scanning our bodies we sought to amplify the 'imperfections' of the digital scanning equipment -- just to see what would happen. Our fluctuating breathing, constantly shifting movements and abrupt outbreaks of laughter (which we made not attempt to refrain from as we worked) were translated into a series of discontinuous mesh fragments that overlapped and intersected one another. With each pass of the scanner, the mesh that was being generated became a mapping of the continually changing 'affective tone' of the event. The imperfections of the hardware, and the possibilities of the movement of the body, were sought out and embraced as part of the act of making. The many layers of mesh that we generated through this process generated a surplus of digital information that affected the verisimilitude of the representation. These excessive meshes were artifacts produced by the performance of our bodies, dancing with the technology, which were then woven into the making of the digital forms. As Boo has already pointed out, the artifacts allow us to discern things about the process that created them. In this case the 'overly sensitive' character of the hardware and software, frustrating to those that wish to produce faithful replicas, was an integral part of what allowed the representation to express the affective tone of the performance itself. In this way representation was inseparable from the act of making.



Similar actions which harness the act of making to representation, expression and performance can be found in Ives Klein's *Antropométrie* paintings. The paintings are records of a series of highly constructed art events, orchestrated by Klein, which were both provocative and highly sensually charged. Beautiful women, covered in thick layers of Klein's signature blue paint, produced images of their bodies by moving in rhythmic, undulating motions against paper mounted on the walls and floor of the artist's studio. Their dance was a response both to the enigmatic

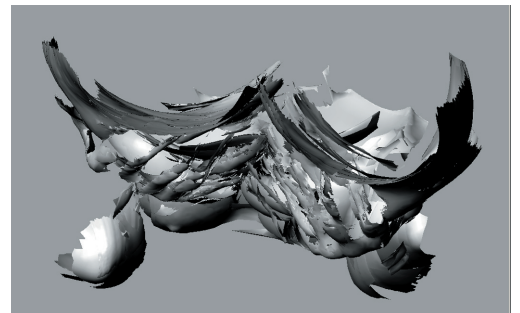
gestures of the artist standing on a step ladder and the sounds of a jazz band playing on the sidelines. Klein's working method resonates with our making of *Parametric Flesh* for a number of reasons; not least the presence of naked female bodies. Like us and the hand held scanner, although he is nominally in charge of the process, Klein does not have his hands directly on the medium (the women's bodies) that actually produce the images. He directs; the band plays; the women interpret and imprint their painted bodies on the canvas. The final images are really the product of the women's self editing of the performance; by the parts of their body that they chose to press against the surface: bellies, breasts and thighs. Like Klein's beautiful women, the scanner is the ultimate editor of the images but the forms are contingent on the event itself. We posed, manipulated our flesh and laughed as we scanned; accepting the fact that the scanning equipment is, at best, an unfaithful mirror of the flesh it passes over. The *Antropométrie* paintings and *Parametric Flesh* are both made through event driven processes that embody various convergences: of artist, flesh, music, speech, audience, laughter, respiration and gestures. Artifacts join the various aspects of the event together and also connect the event with the person that encounters its residue in the images. Here information remembers it has a body and the body asserts itself in the process of making. By incorporating the qualities of the 'event of making', both works introduce artifacts into the replication. These artifacts upset the expectations of a 'life-like' digital representation and instead imbue the images with the expression of the life of the event itself.



## **Artifact Output**

*Here we discuss the scans themselves as artifacts and the series of actions by which they were edited together. The output, in the form of a poster, (the cultural artifact) has been exhibited in various contexts, including the Beijing Biennale of Architecture and Curvatecture, Melbourne.*

**Boo says:** A surface or boundary is a particular point in space at which matter changes density. To be experienced as continuous, the weave must be tighter than our perceptual ability to resolve difference. It is thus an artifact of the intersection between the process by which density is created and the perceptual process. The illusion of verisimilitude in the digital surface is created at the interface between the speed of the interval in which the laser is pulsed and reflected and in the fineness of the resolution in which these captured digital fragments are processed and represented as pixels on screen. A surface or boundary is also an inherently spatial-temporal phenomenon. In the science of haptics, it is well known that a human subject is not able to experience the textural contours of a surface unless they are able to move their body against it. In this case, to capture the contours of a body, the laser scanner moves across it multiple times and so captures a residue of this time taken in space. Discontinuities in the position of the body over time manifest as discontinuities in the space of the represented surface. Gaps, nodules and duplicated fragments in the scan are, thus, representative of a body moving. The appearance of the surface, animated with extra protrusions and lacking the closure of a distinct boundary, suggests a quality to life that is always more than, or outside the bounds of, what is capturable in digital form. As Massumi writes: “[i]n motion, a body is an immediate, unfolding relation to its own nonpresent potential to vary” and, as such, there is no point at which a living body does not incorporate an “openness to an elsewhere and otherwise than it is, in any here and now.” (Massumi:p4) What is captured in digital representation, is thus always after the fact; a residue of an actualised potential that fails to represent the potent indeterminacy of the living. It is a record of a series of discrete points at which a moving body was previously interfaced with a digital capture device. The discontinuous surfaces of the monstrous, body-like, but strangely constructed, scans are exfoliations of this moving process of life.

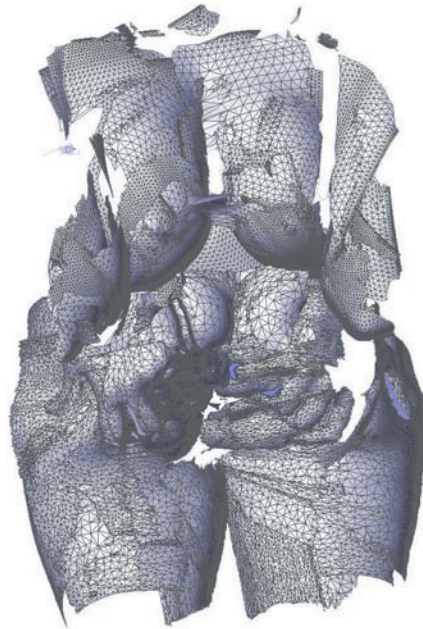


Around the time that we were playing with the scanner, other researchers at SIAL were preparing poster presentations to send to Beijing. In a fairly opportunistic manner, Inger and I decided to create a poster out of our scans. Once we had done a number of scans, we captured 2D images of the 3D models in Rhinoceros and imported them into Photoshop where we stitched them together into various monstrous combinations – Inger’s breasts with my backside, her belly and my thighs – in a way that reflects the playfully collaborative nature of the project. A grid-like texture, derived from the mesh of the original models, covered the surface and the images



were coloured in Photoshop in parody of a certain ‘slick’ digital design aesthetic, which is common in architectural rendering practice. While the grid had the superficial effect of structuring and normalising the images, it also hid a lewd and unstable surface behind it. Those, who looked closely would be startled at the promiscuous and strangely unfinished content of the images, manifesting themselves under the guise of a cool digital exterior. Thus, the poster speaks to its own process of coming into being and to the context in which it was created. It is an artifact of the relationship between our laughing bodies and the scanner, our research concerns and the situation in which digital architecture is practiced at SIAL. It draws together an experiment in the limits of the laser scanning technology with certain philosophical concerns regarding the nature of the living body, in order to comment on a particular representational paradigm. It joins together domains through parody and quotation, moving flesh and beams of light.

**Inger says:** As I pointed out in my previous section, in the *Parametric Flesh* project digital representation was integral and inseparable to the process of making. In this project digital representation did not function as a mirroring technology (a maker of endless, perfect copies) but as part of the performance of an event. The original information, captured from the flesh in motion, is inflected: bent or deformed 'out of true', both by the scanning equipment and by the subsequent editing of the meshes and the process of composition. Or perhaps this process of translating flesh into information and then into image could better be described as a series of *modulations* where the information does not remain unchanged, or unscarred, as it is translated through different representational mediums.



The editing process was highly conscious; meshes from different bodies and parts of bodies were collaged together to produce new and monstrous bodies which took their cue from the headless statues of greek ruins and the early fertility idols of Africa. When the meshes created by the 3-D scanner were exported to the modelling program RHINOCEROS their density was adjusted in order to generate different effects with the intersecting layers of triangulated surfaces. The triangulations of the surface mesh were deliberately kept intact during the rendering process by tweaking the display settings in the RHINO modelling window and outputting directly from the screen display. In this way the resulting lines were treated as a type of found ornamentation which delineated and gave character to the surfaces; parodying the 'techno fetish' of the contemporary digital image but retaining the messy rawness.

A camera was placed in the RHINOCEROS modelling window and carefully rotated around the collaged mesh in order to extract a series of images in a process parodying the digital 'fly through' of a potential new building. The images were laid out on the poster page as if it were a series of snapshots from a fly through of an architectural project. However our fly through did not serve to replicate a discrete series of thumbnail images that attempt to replicate the phenomenological experience of walking through a building, instead it was a deliberate 'peerve': a drawn out luxurious looking over from all sides. It was, to paraphrase William Hogarth, the deliberate leading of the eye on some kind of 'wanton chase'. The trajectory of the fly through around the model is a repeat with difference for each of the different 'monsters' — never twice exactly the same. The repetition of similar images on the poster page was intended to produce an aesthetically pleasing composition (akin to the laying out of pretty pieces of jewellery on black velvet) rather than an entirely descriptive composition. Some parts still remain a mystery. Finally, a blush of colour was added to the rendered images in PHOTOSHOP which acted as a form of visual 'camouflage' that ties it in with the representational style that I earlier described as 'techno fetish'. Parametric flesh has co-existed happily, perhaps occasionally subversively, amongst other digitally speculative architectural images with which it has subsequently been exhibited<sup>3</sup>. Curiously it has often actually been mistaken as an experiment into potential building forms by the occasional passer-by who might not have looked too closely at the content.

## **Conclusion**

*The Parametric Flesh project can be understood as an investigation of how to reinsert the contingent and embodied nature of the design or art making process into the design itself. Accordingly, we did not enter into this research with a set of preformulated questions and a series of answers, or statements, that we would like to express in the work, but rather the situation itself generated a questioning exploration. The process of making was essential to the nature of the artifact. Parametric Flesh contests and disrupts the purity and separation of digital representation from its products or outcomes. It does not seek to construct or replicate the conditions of the world but to intersect dynamically with it. The intersection between the actual physicality of the body, and the digital representational technology used to record it, violently interrupts the smoothness that we have come to expect from the digital surface. The technicality of the artifact, the artifice by which it joins together domains, is revealed. When approached in this way, digital representation is no longer neutral but becomes loaded with possibilities and potentials for designerly action.*

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### **(Footnotes)**

<sup>1</sup>Boo Chapple, Arianna Wilson and myself

<sup>2</sup>Foo Chi Sung

<sup>3</sup>Parametric Flesh was exhibited at the Beijing Bienale in 2004 and the 'Curvature' exhibition in Melbourne in early 2005.

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