

MAKING DWARFED WHITE JACK

By Rona Pondick





















製作〈迷你白傑克〉

A: The photo above shows Dwarfed White Jack in its original state. The tray was first modeled in clay. A mold was made, and resin positives were cast. The tree root, trunk, and branches were modeled over a copper wire armature with a modeling compound that cures to a stone-like hardness. The heads were made from a previous 3D scan and 3D builds made in 1998.

The translation of the tray into metal loaned itself to milling. The resin was scanned, an STL file was made, and the tray was milled in aluminum.

B shows the aluminum tray and one section of the sculpture. The root and half of the trunk (in the photo above) were simple enough and large enough in form to approach in a traditional manner where we made a silicone rubber mold, poured waxes, and did investment casting in bronze.

Because I made the branching so complex and thin, it would be difficult to make molds of the tree canopy. If figured out I would need around 250 molds. Michael Raphael, from Direct Dimensions, believed he could eliminate the need for the molds by scanning the tree canopy at a relatively low resolution in my studio. The heads had to be dealt with in a different way. We cut the tree canopy into six sections and mounted them on a freestanding pedestal so that a 3D scanner with a long arm could pass freely around it to collect the data.

C shows the scanned tree canopy without the heads attached. It was color-coded to show the separate sections. Once we had all of this data we head to tackle many technical problems. Some branches were too thin and there were areas where digital data was missing. This had to be reconstructed in the computer where we worked together to maintain the integrity of the original.

D: I wanted the heads on the tree to be roughly ¼ to ½ inch in size while retaining a high level of detail. This is very complicated to achieve in 3D scanning and 3D modeling. I suggested to Direct Dimensions that we scan a life-sized

head without skin texture at a higher resolution than the branches. We could then merge the STL file of the head with the lower resolution STL files of the branches at a later time. In **D1**, the image on the left shows the life-cast of my head cast in resin with the skin texture removed. **D2** shows stills from the STL head file.

E1 and E2 show examples of how the head scan and tree branch scans were merged. Because the branch section and heads were going to be built with different 3D printers they had to be divided into separate STL files. In the end, there were 45 separate STL files for the heads. There were 11 STL files for the branches, in part because the branches were scanned and built at a much lower resolution than the heads.

Once the STL files were finalized we needed to find a material that we could build them in using investment casting. Many companies claimed to have materials made specifically for casting in metal. We did many tests but the builds kept exploding during the burnout process. We spent over six months experimenting with different build materials. Eventually, with the help of Jon Lash at Digital Atelier, we learned that we needed to burn out the material using a process called flash firing. Jon also introduced me to Solid Concepts, a 3D printing company, who made a material for investment casting that didn't explode.

We worked very closely with an engineer at Solids Concepts to determine how to combine the STL files into larger build sections. By bringing down the number of computer build sections we were able to bring down the cost. We had many other technical issues that we needed to resolve, including whether we should build the sections solid or hollow. We also had to increase the overall size of the builds to account for shrinkage during the casting

The STL files of the heads were sent to my jeweler who has a 3D printer that can build layers that are 0.0127 microns in thickness. This means that each layer is so thin that it leaves very little computer build texture on the surface.

He built 45 different heads in varying sizes and then cast bronze masters and made vulcarized rubber molds. We injected wax into these molds to make 45 heads we could merge, using hand modeling, with the computer built branches. It was very complicated to figure out the exact sizes the original computer build of the heads should be, to anticipate the shrinkage inherent in the various processes, so that the wax heads would join seamlessly with the computer built branches.

Once we merged the wax heads with the computer builds we did a number of test castings in bronze. In the bronze sections we found that there was too much computer texture on the branches, and we were losing all of our detail and undercuts in the heads. For future castings we had to adjust every single wax head by hand and exaggerate all of the features and undercuts. Because the branches were so thin we could only sand out so much of the computer texture in the resin material and had to finish correcting this in the metal by hand.

F: Once we had a successful casting of a section in bronze we did tests with my painter to see if we could paint the bronze and aluminum tray to look like white porcelain. It took a year to model the tree and aesthetically resolve it. It took another year to translate the first of the edition into bronze and paint it. On each piece in the edition we had to figure out how to take all of the cast bronze parts and weld them together in the correct spatial relationships before the sculpture could be painted. We thought many times during the process that the sculpture would never be completed and, looking back, I am amazed we figured all of this out.

I know most people think the computer will totally replace what we can do by hand. This piece underlined something I already knew. The computer is just a tool to assist, but it cannot replace what I can do by hand. I would never have been able to complete Dwarfed White Jack if I were totally dependent on the computer. In the end, my hand saved the piece.

(以下內容摘要自本篇報導)

A: The photo above shows *Dwarfed White Jack* in its original state. The tray was first modeled in clay. A mold was made, resin positives were cast. The tree root, trunk, and branches were modeled over a copper wire armature with a modeling compound that cures to a stone-like hardness. The heads were made from a previous 3D scan and 3D builds made in 1998.

A:上面的照片是〈迷你白傑克〉的原始狀態。作品中的托盤一開始是用黏土建模的。當模具製作完成,然後才使用一種可硬化如石塊的化合物,鑄造樹根、樹幹和樹枝的模型。頭部是根據先前在1998年進行的3D掃描和3D建模製作的。

The translation of the tray into metal loaned itself to milling. The resin was scanned, an STL file was made, and the tray was milled in aluminum.

為了將托盤轉換為金屬,必須使用銑削技術。再將樹脂掃描,生成STL檔,然後用鋁 進行銑削。

B shows the aluminum tray and one section of the sculpture. The root and half of the trunk (in the photo above) were simple enough and large enough in form to approach in a traditional manner where we made a silicone rubber mold, poured waxes, and did investment casting in bronze.

B是鋁製托盤和雕塑的一部分。根部和樹幹的一半(如上圖所示)在形狀上足夠簡單

且足夠大,所以可採用傳統方法進行處理,即製作矽橡膠模具,倒蠟後進行青銅的鑄 造。

Because I made the branching so complex and thin, it would be difficult to make molds of the tree canopy. I figured out I would need around 250 molds. Michael Raphael, from Direct Dimensions, believed he could eliminate the need for the molds by scanning the tree canopy at a relatively lower solution in my studio. The heads had to be dealt with in a different way. We cut the tree canopy into six sections and mounted them on a freestanding pedestal so that a 3D scanner with a long arm could pass freely around it to collect the data.

由於樹冠是如此複雜且纖細,要製作樹冠的模具非常困難。我估計需要大約250個模具。3D工程顧問公司Direct Dimensions 的 邁克·拉斐爾 (Michael Raphael) 認為,若以相對較低的解析度掃描樹冠,就能解除對模具的需求。另外,處理頭像的方式也必須不同。我們將樹冠切成六個部分,並安裝在一個獨立的基座上,以便一臂式3D掃描儀可以自由通過周圍收集數據。

C shows the scanned tree canopy without the heads attached. It was color-coded to show the separate sections. Once we had all of this data we had to tackle many technical problems. Some branches were too thin and there were areas where digital data was missing. This had to be reconstructed in the computer where we worked together to maintain the integrity of the original.

C是不含頭像的掃描樹冠,各部分使用彩色編碼,以明顯區分。在獲得所有數據之後,有許多技術問題必須解決。有些樹枝因為太薄,而搜集不到數據,所以必須在電腦中重建,以保持原始數據的完整性。

D: I wanted the heads on the tree to be roughly 1/4 to 1/2 inch in size while retaining a high level of detail. This is very complicated to achieve in 3D scanning and 3D modeling. I suggested to Direct Dimensions that we scan a life-sized head without skin texture at a higher resolution than the branches. We could then merge the STL file of the head with the lower resolution STL files of the branches at a later time. In D1, the image on the left shows the life-cast of my head cast in resin with the skin texture removed. D2 shows stills from the STL head file.

D:我希望樹上的頭像大約在1/4到1/2英寸的大小,同時保持逼真的細節。在3D掃描和3建模中要實現這點非常複雜。我向Direct Dimensions建議,應該要以比樹枝更高的分辨率先掃描沒有皮膚紋理的人頭。接著可以將頭像的STL檔與樹枝較低分辨率的STL檔合併。在D1中,左側的圖像是用樹脂製成的頭像真實大小模型,皮膚紋理皆被去除。D2是頭像STL檔的靜止畫面。

E1 and E2 show examples of how the head scan and tree branch scans were merged. Because the branch section and heads were going of be built with different 3D printers they had of be divided into separate STL files. In the end, there were 45 separate STL files for the heads. There were 1 STL files for the branches, in part because the branches we rescanned

and built at a much lower resolution than the heads.

E1和E2展示如何合併頭像掃描和樹枝掃描。由於樹枝部分和頭像將使用不同的3D列印機建造,它們必須分割成單獨的STL檔。最終,頭像有45個單獨的STL檔。樹枝只有1個STL檔,因為樹枝是被重新掃描並以比頭像低的分辨率構建的。

Once the STL files were finalized we needed to find a material that we could build them in using investment casting. Many companies claimed to have materials made specifically for casting in metal. We did many tests but the builds kept exploding during the burnout process. We spent over six months experimenting with different build materials. Eventually, with the help of Jon Lash at Digital Atelier, we learned that we needed to burn out the material using a process called flash firing. Jon also introduced me ot Solid Concepts, a 3D printing company, who made a material for investment casting that didn't explode.

一旦STL檔確定了,我們就需要找到可以使用鑄造進行建模的材料。許多公司聲稱擁有專為金屬鑄造而製的材料。但我們進行了許多測試,在燃燒過程中總是會爆炸。我們花了六個多月的時間嘗試不同的建模材料。最終,在數位工坊 Digital Atelier的強·拉許(Jon Lash)幫助下,我們了解到需要以稱為「閃焰燃燒」的過程進行燃燒。強還介紹了3D列印公司Solid Concepts給我,提供了我們在鑄造過程中不會爆炸的材料。

We worked very closely with an engineer at Solids Concepts to determine how to combine the STL files into larger build sections. By bringing down the number of computer build sections we were able to bring down the cost. We had many other technical issues that we needed to resolve, including whether we should build thesections solid or hollow. We also had to increase the overall size of the builds to account for shrinkage during the casting process.

我們與Solid Concepts的一位工程師密切合作,確定如何將STL檔合併成更大的建模部分。要減少電腦建模部分的數量,才能夠降低成本。我們還有許多其他技術問題需要解決,包括應該將這些部分建成實心還是中空。我們還必須增加建模的整體尺寸,以應對鑄造過程中的收縮。

The STL files of the heads were sent to my jeweler who has a 3D printer that can build layers that are 0.0127 microns in thickness. This means that each layer is so thin that it leaves very little computer build texture on the surface.

我將頭像的STL檔發送給我的珠寶師,他擁有一台3D列印機,建造厚度可小至0.0127 微米。因為每一層都非常薄,幾乎不會在表面上留下電腦建模的紋理。

He built 45 different heads in varying sizes and then cast bronze masters and made vulcanized rubber molds. We injected wax into these molds to make 45 heads we could merge, using hand modeling, with the computer built branches. It was very complicated to figure out the exact sizes the original computer build of the heads should be, to anticipate the shrinkage inherent in the various processes, so that the wax heads would join seamlessly with the computer built branches.

他建造了45個不同尺寸的頭像,然後製作銅模型並製作硫化橡膠模具。我們將蠟注入這些模具中,以製作45個可以通過手工與電腦建模的樹枝相結合的頭像。要確定頭像的原始電腦建模是確切尺寸十分複雜,需要預測各種過程中固有的收縮,以便蠟頭能夠與電腦建模的樹枝無縫結合。

Once we merged the wax heads with the computer builds we did a number of test castings in bronze. In the bronze sections we found that there was too much computer texture on the branches, and we were losing all of our detail and undercuts in the heads. For future castings we had to adjust every single waxhead by hand and exaggerate all of the features and undercuts. Because the branches were so thin we could only sand out so much of the computer texture in the resin material and had to finish correcting this in the metal by hand.

一旦我們將蠟頭與電腦模型合併,才能進行青銅的試鑄。在青銅部分,我們發現樹枝上的電腦紋理過多,並且失去了所有頭像的細節和凹陷。對於將來的鑄造,我們不得不手動調整每個蠟頭,擴大所有特徵和凹陷。由於樹枝很薄,我們只能在樹脂材料中磨掉電腦紋理的一部分,且不得不手工完成這部分的修正。

F: Once we had a successful casting of a section in bronze we did tests with my painter to see if we could paint the bronze and aluminum tray to look like white porcelain. It took a year to model the tree and aesthetically resolve it.

F:一旦我們成功鑄造了一部分的青銅,就要與畫家測試是否可以將青銅和鋁托盤塗成白瓷的效果。為了兼顧美學,我花了一年的時間來建模樹木。

It took another year to translate the first of the edition into bronze and paint it. On each piece in the edition we had to figure out how to take all of the cast bronze parts and weld them together in the correct spatial relationships before the sculpture could be painted. We thought many times during the process that the sculpture would never be completed and, looking back, I am amazed we figured all of this out.

花了另一年的時間將第一版作品轉換為青銅並上色。在第一版的每一部分上,我們都 必須找出所有的鑄造青銅零件焊接在一起,並且在上色之前處於正確的位置。整個過 程中,我們多次認為永遠無法完成這件作品。但回顧過去,我很驚訝我們可以找到所 有解決方案。

I know most people think the computer will totally replace what we can do by hand. This piece underlined something I already knew. The computer is just a tool ot assist, but it cannot replace what I can do by hand. I would never have been able to complete Dwarfed White Jack if I were totally dependent on the computer. In the end, my hand saved the piece.

我知道大多數人認為電腦將完全取代我們手工所能做的事情。這件作品強調了電腦只是一個輔助工具,它無法取代手工所能做的事情。如果我完全依賴電腦,我永遠無法

完成〈迷你白傑克〉。最終,是我的雙手拯救了這件作品。



「雙樹」

(以下內容摘要自本篇報導)

Two Trees presents the work of two exceptional contemporary artists working with computer technologies: Rona Pondick and Jennifer Steinkamp. On the face of it, their work seems to have little in common other than their subject matter. Each artist presents in this intimate exhibition a representation of a tree. Steinkamp's Judy Crook (2012-13) undulates elegantly and majestically transforms through a seasonal cycle as it buds, blossoms, turns color and ultimately sheds, only to begin the cycle again. Pondick's Dwarfed White Jack (2010-12) sits serenely on a low pedestal, a ghostly bonsai on a pure white minimalist tray, seemingly frozen in time and transported from another dimension. Careful inspection reveals that it too is budding. It is the blank visage of the artist herself, however, that is poised to blossom.

展覽「雙樹」展出了兩位優秀當代藝術家羅娜·龐迪克(Rona Pondick)與珍妮佛·斯坦 坎普(Jennifer Steinkamp)運用電腦技術完成的作品。乍看之下,除了主題外,這兩 位藝術家的作品似乎沒有太多共同之處。兩位藝術家在本次展覽中,以自己的角度去 詮釋一棵樹。珍妮佛的〈Judy Crook〉(2012-13)優雅起伏,在一個季節周期,發 芽、開花、變色,最終脫落,然後重新開始。羅娜的〈迷你白傑克〉(2010-12)安靜 地坐在低矮的基座上,如幽靈般的盆景放在純白色極簡的托盤上,彷彿來自另一個維 度,凝固在時間中。仔細觀察可以發現,它也在發芽:藝術家的空白面容即將綻放。

Composed of computer code and projected light, Judy Crook transports us to another place, a virtual forest that is at once present and absent in the gallery. Its scale and rhythmic

animation seduce us; its ethereality made corporeal as we feel it in our muscles. It's not there, yet it possesses us physically, all embodied perception and muscle memory. Dwarfed White Jack commands a slower, but no less enveloping apprehension. Its Zen beauty and delicate equilibrium reveal its power more subtly.

由電腦代碼和投影光組成的〈Judy Crook〉將我們帶到另一個空間,好似在畫廊中既存在又不存在的虛擬森林。它的尺度和節奏感動人心,它的虛無感在我們的肌肉中變得有形。它雖然不存在,但在肉體上卻擁有我們,具體表現出所有體感和肌肉記憶。〈迷你白傑克〉則帶有一種更緩慢的意象但同樣籠罩著憂慮。它的禪美和微妙的平衡更加細緻地展現了它的力量。

Two Trees presents something of aparadox in its landscape of artificial nature. While Steinkamp's virtual tree immediately takes hold of the viewer physically, Pondick's very physical painted bronze bonsai incintiates itself into our consciousness more slowly. Recognizing the human faces extruding from the dwarf limbs, one cannot help but consider its mythological antecedents. Could these be the impossible children of Daphne and Apollo?

展覽「雙樹」呈現出人造自然景觀中的悖論。珍妮佛的虛擬樹直接抓住觀眾的眼球,羅娜的盆景雕塑則是慢慢地更深入我們的意識。當我們認識到從矮小的樹幹中伸出的人臉時,不禁會考慮它來自哪個神話?這是否是達芙妮和阿波羅所生的孩子呢?

These buds will blossom not on the delicate white branches, but in the viewer's imagination. Our emotional path from empathetic horror to physical identification with the botanically immobilized heads takes place almost entirely in the imagination. Metamorphosis and nightmarish imagination are at the heart of how Dwarfed White Jack operates on the viewer. It is no surprise that Pondick cites Franz Kafka as a key inspiration: "Do you know Kafka thought the short story "Metamorphosis" was hysterically funny? He would laugh out loud whenever he read it. The first time I read it that wasn't my reaction. But on subsequent readings, I discovered the absurdity and humor in his darkness. It's like a laugh in the dark, and it's everything I want in my work."

這些芽不只在細膩的白色樹枝上綻放,而烙印在觀眾的想像中。我們從恐怖共鳴到對植物般固定的頭像產生身體認同,幾乎完全發生在想像中。變態和夢魘的想像力是〈迷你白傑克〉影響觀眾的核心。卡夫卡是羅娜重要的靈感來源:「你知道卡夫卡認為《變形記》這個短篇小說非常滑稽嗎?他每次讀都會大笑。我第一次讀時並沒有這種感覺。後來我發現他黑暗中的荒謬和幽默,就像黑暗中的笑聲,這正是我希望表達在我的作品上的一切。」

If Judy Crook inspires Steinkamp's viewers to sympathetic bodily abandon (and it does), Dwarfed White Jack's black humor operates by planting seeds of terror – those zombie buds – in her viewers' minds. Indeed, Pondick's trees grew out of a dream: "I dreamed that my head was the size of a tiny bud on a tree, and I had to make it. *Pussy Willow Tree* (2001) is a tree with hundreds of my heads grafted onto the branches as if they are growing on it." As curator Joe Houston has observed, Pondick "has managed ot provoke physical and psychological unease, redefining the polite relationship between object and viewer, and in

the process, disturbing that tenuous boundary between the personal and the social."

如果〈Judy Crook〉激發觀眾對拋棄身體感到共鳴,〈迷你白傑克〉的黑色幽默則在觀眾的心中種下恐懼的種子。事實上,羅娜的雕塑靈感來自於一場夢:「我夢見我的頭部像樹上的一個小芽那樣大,而我必須做出來。〈貓柳〉(2001)是一棵上面嫁接著數百個我的頭像的樹,那些頭像彷彿在上面生長。」正如策展人喬·休斯頓(Joe Houston)所觀察,羅娜「成功地引起了生理和心理的不安,重新定義了物體和觀眾之間的舒適距離,並在過程中擾亂了個人和社會之間脆弱的界限。」

Both artists play with ideas of transformation, hybridization, and even mutation. Steinkamp uses the term "fake nature" to describe these works. And they, too, are rooted in mythology. As curator Joanne Northrup notes, when she began working on her animated trees, "Steinkamp had been reading feminist interpretations of Medusa as a metaphor for female power and sexuality." The sensually swaying trees are inspired by the serpentine hair of the mythological Medusa. The spell Judy Crook casts on viewers is rooted in this mythological power, just as Dwarfed White Jack's capacity to instill physical and psychological unease is rooted in a twisted metamorphic story by Kafka and the artist's own dream.

兩位藝術家都玩味著轉變、雜交,甚至突變的概念。珍妮佛的作品以「虛假自然」呈現。作品的靈感也根植於神話。正如策展人喬安·諾斯羅普(Joanne Northrup)所表示,當她開始製作她的動畫樹時,「珍妮佛一直在閱讀將美杜莎解釋為女性權力和性別的隱喻相關女性主義文章。」這些感性搖擺的樹受到神話中美杜莎蛇髮的啟發。〈Judy Crook〉對觀眾施加的咒語來自神話力量,而〈迷你白傑克〉靈感取自於卡夫卡扭曲的變態故事和藝術家自己夢境中所體會的生理和心理不安。

Steinkamp's animated tree and Pondick's metamorphically paralyzed bonsai each suggest, in different ways, the pervasiveness of artificial nature in contemporary culture. Steinkamp's animated trees have been granted supernatural powers through the magic of computer coding, and Pondick's bronze beauties entered the world at a moment when the growth of genetically modified foods has raised global concerns about their potential impact on human development. The differences between the virtual and the real have become increasingly blurred. Judy Crook and Dwarfed White Jack dazzle in so many different ways, but among them is their power to bring these blurred lines of the contemporary moment into sharp focus.

珍妮佛的動畫樹和羅娜的盆景雕塑各自以不同的方式表明,當代文化中普遍存在的人工自然景觀。珍妮佛的動畫樹透過電腦編碼的魔力賦予超自然的力量,而羅娜的青銅之美則創作於基因改造食品的問世,而引起全球關切的時代。虛擬和現實之間的差異變得越來越模糊。〈Judy Crook〉和〈迷你白傑克〉有許多可看的地方,其中一部分是它們將當代議題中模糊的界線,帶入銳利的焦點。