催化形制一建筑与数字化设计

CATALYTIC FORMATIONS ARCHITECTURE AND DIGITAL DESIGN

[美] 阿里·拉希姆 著叶 欣 主译陈 莎 蔡风华 邵庆华 范金莎 译

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Elegance in the Age of Digital Technique

Why Elegance?

Beyond the austerities of digital technique, elegance concerns refinement, precision and formal opulence. Elegance integrates an aesthetic desire, unleashing a visual intelligence pertinent for all design fields at all scales.

The concept of elegance has the ability to push the discourse of contemporary architecture forward, by accepting that complex architectural compositions require an accompanying visual aesthetic as sophisticated as the current techniques used to generate form.

Elegance mediates and enables complexity. A tightly controlled, precise refinement in technique is required to mold transformative surfaces that incorporate distinctly different topological features. The results are potentially chaotic. Negotiating and restraining the visual opulence of these compositions is an operation that entails elegance.

The works and works-in-progress presented in this issue probe the concept of elegance. They display a simultaneous maturation of digital and material practice: but beyond this refined mastery of

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数字技法时代的优雅

为什么要优雅?

优雅超越了数字技法的简约,专注于精巧、精确以及丰富的形态。优雅中还融入了对美的追求,它所展现出的视觉智能适宜于设计的一切领域,不论其大小。

正如设计师会运用最新的技法来创造精致的建筑形态一样,复杂的建筑构图旨在营造出精致的视觉效果。这种优雅的观念可以推动当代建筑话语向前发展。

优雅直接或间接地促成了复杂性的生成。要打造出具有不同拓扑特征的变化表面就必须对技法实施严密的控制以及精确的调整。虽然效果可能显得杂乱,但通过对建筑构图营造出的丰富视觉效果加以引导和约束,仍不失为实现优雅的手段之一。

technique, these architects move towards an integration of an aesthetic desire, that we believe yields elegant results.

Digital Tools, Elegant Forms

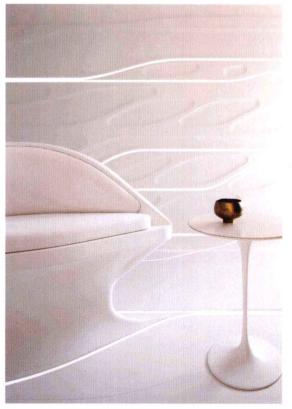
We are very interested in elegance that has arisen from the use of relational equations and scripting mediated by digital techniques. This includes subdivision surfaces and NURBS modeling, tools that incorporate the most advanced results of experimentation in digital design.

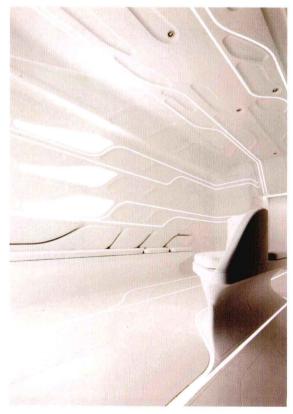
As a premise for our investigation, we believe that progressive digital techniques are pivotal to moving forward in the field of architecture. But often taken for granted are the design research,

我在这里向大家介绍的所有建筑作品,不论已 建或是在建的,都是对优雅这一观念的探究。这些 建筑作品体现了建筑师对数字技术与材料炉火纯青 的运用:除了展现出这种对技法的熟练运用,他们 还孜孜不倦地追求美。我们相信,正是这一点,带 来了优雅的效果。

数字化工具与优雅的形态

人们通过数字技法对关系方程式以及脚本编辑 加以运用。在这个过程中,优雅应运而生,我们对 此兴趣浓厚。这些数字技法融合了数字化设计领域





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mastery of techniques and sheer talent required to produce the most sophisticated of contemporary projects enabled by digital techniques.

Elegance confronts this shortcoming in critical discourse by arguing that the mastery of techniques, whether in design, production or both, does not necessarily yield great architecture. As we all know-or can easily see by surveying institutions teaching digital technology—the most advanced techniques can still yield average, or even terrible, designs! Only certain projects achieve elegance. This studio attempted to move *beyond* technique, by mastering them to such a degree that they are able to achieve nuances within the formal development of their projects that exude elegance.

Architects who have been able to add that layer of aesthetic sophistication to their designs share several characteristics pivotal to

最新的实验成果,包括细分曲面和 NURBS 建模等工具。

数字技法的不断进步对建筑学的发展至关重要,这也是我们调查的前提之一。然而,人们却常常忽略设计研究、技法的掌握以及天赋等其他因素。要想利用数字技法创作出当代最杰出的建筑作品,这些因素都是不可或缺的。

与上述那种片面认识截然不同,优雅的观念认为,即使掌握了设计技法或是建造技法,抑或这两种技法同时掌握,也未必能创造出伟大的建筑作品。 众所周知——或者只要在任何一所教授数字技术的 学院中进行—番调查即可明白——即使是最先进的 技法仍可能带来平庸的甚至低劣的设计,仅有为数



the digital design discourse today. All of the featured designers operate within emerging paradigms of generative techniques, and have moved past methods completely dependant on the rigorous application of scientific standards. Each exhibits a systemic logic of thought that eschews mapping a specific process, or revealing the process of an algorithm being generated, as strategies to generate a project's form. Instead, mastery of technique allows them to assume a more sophisticated relation to the creation of form — a position only made possible through the use of an aesthetic sensibility concomitant with a highly developed design ability.

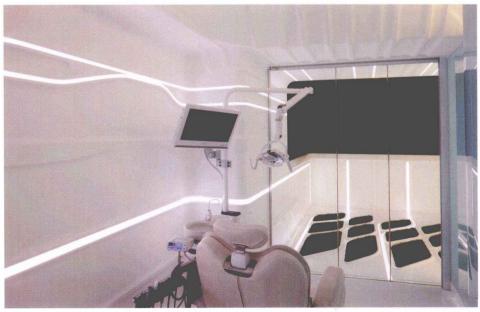
Design ability enables these architects to incorporate the myriad conditions for architectural creation-including, but not limited to, constraints associated with zoning, building codes, organization, space, program, circulation, fabrication, assembly, and cost—in a process facilitated by the digital algorithm and enabled by scripting. In the most elegant of designs, scripting is used to develop new types of interrelational schemes, that integrate all of the design and

不多的项目堪称优雅之典范。本工作室希望可以超 越单纯的技法,通过熟练的技法手段去呈现建筑形 态的细微差别,让建筑洋溢出优雅。

那些能够将美感丝丝入扣地融入设计中的建筑师,通常拥有这样几个共同的特点,而这些特点对于当今数字设计话语的发展举足轻重。这些个性鲜明的设计师都能运用新兴的生成技法范式进行工作,而不再像过去那样生搬硬套既有的科学标准。他们的思维系统具有逻辑,超越了思维定势,不再通过一步步的运算来创作出项目的形态。相反,这些设计师能够运用掌握的技法去创造更为复杂的形态,而要想达成这样的目标,就必须将对美学的认知与杰出的设计能力二者有机结合起来。

这些设计师具有出色的设计能力,能够将各种纷繁复杂的条件融入建筑创作中,这些条件包括(但不局限为)分区布局、建筑规范、结构、空间、功能、交通流线、装配、物建和成本等制约因素。这个过





manufacturing intentions in one seamless model. Ultimately, the architect's challenge is to control the modulation of these relations, in order to endow each project with the desired affect.

The Pursuit of Elegance

A beginning to the achievement of elegance in architecture is the use and mastery of the digital techniques afforded to us by customizable software. A reliance on scripting procedures rarely yields an elegant project, but manipulation of code through the mediation of digital technique is essential to yielding elegance. Working through the process of mastering techniques is internally driven, and is a necessary underpinning to developing a sensibility for the formal features achieved through the course of design.

程会离不开数字运算以及脚本编辑的帮助。在那些最为优雅的设计方案中,设计师运用脚本编辑来开发新的关联方案,这些方案将所有的设计和建造的意图融合到一个无缝的模型中。建筑师面临的终极挑战是如何控制和调整这些关系,实现项目期望的情感效力。

追求优雅

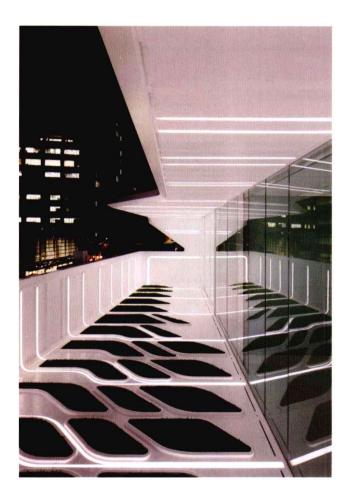
要创作出优雅的建筑作品,首先要掌握并学会熟练运用那些由可定制软件提供的数字技法。其实单纯地依赖脚本编辑是很难创造出优雅的建筑项目的。如何运用数字技法来操作代码、打造出优雅,这才至关重要。在掌握技法的基础上进行设计,既

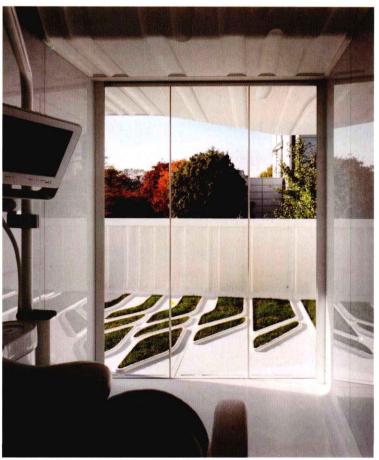


Frei Otto used one parameter to generate all of his landmark research on tensile structures: that of gravity's relationship to the coefficient of material elasticity. Driven by an interest in the minimal use of materials, his research employed analog computing methods to yield results constituted of singular features: for example, a catatonic curve, or a derived surface that repeated itself to produce larger formal organizations. These analog methods did not have the capacity to produce two competing relational criteria as a means of generating form.

是每个建筑师自己的内在需求,也是培养他们对形态特征的灵敏度的一个必要基础,这些形态特征是 在设计过程中逐渐形成的。

弗赖·奥托仅仅运用一个参数就完成了他对 张拉膜结构的全部重要研究,即重力与材料弹性系 数之间的关系参数。由于他热衷于使用最少的材 料来进行创作,所以他的研究采用模拟计算的方 法来生成许多别具特色的造型,比如张力曲线或 衍生曲面。这些曲线或曲面通过自我复制可以生





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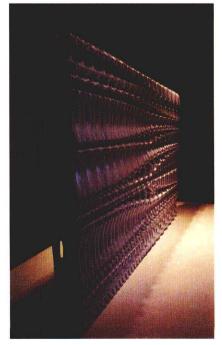
As architecture s multiple complexities are difficult to condense into a single formal criterion, it becomes apparent that a more interrelational set of criteria is needed to develop architecture through algorithmic methods. As more parameters are incorporated, the ability for a greater number of formal features to emerge becomes possible. The presence of several relational criteria allow for a family of interrelated features and forms to be constituted in the work; however, these arise only with specific intentions or goals for the project. When multiple criteria are employed, the formal design development is subsumed within the techniques used: the final design does not necessarily reveal the process of its creation. Hence, the process of production cannot be conceptually read in the final form that results from the design act.

The act of design is, therefore, ultimately framed not by a singular aesthetic end, but by the multiple constraints and ambitions of each project, as negotiated by the architect. To develop elegant

成更为巨大的形态结构。但这些模拟计算的方法 并不能生成两种相对立的关系标准,因此不能帮助 形态的生成。

由于建筑具有多重的复杂性,我们很难将其浓缩成为一种单一的形态标准,所以显然需要制定一套关联性更强的标准,通过计算法来开发建筑。一旦在设计中融入更多的参数,就有可能创造出更丰富的形态特征。数个不同的关系标准的出现让建筑作品具有了某一类相关的特征与形态,然而,这些特征与形态的出现只是为了实现建筑项目的某个具体目的或目标。在运用了多重标准之后,建筑形态的设计开发就隶属于建筑师所运用的某个技法:最后的设计成果并不一定能呈现创造的过程。因此,人们在理念上很难从建筑设计的最终形态上寻觅到创作过程的影子。





work, layered levels of design intelligence are required, effortlessly incorporating *organizational* and *spatial* aspects.

Organizationally, the traditional concept of program is re-defined through the visible relationships produced by precisely controlled use-potential. In this definition, use-potential may yield relationships that emerge through the ongoing interactions between the user and the spaces.

Spatial configuration and organization act as criteria relational to the form of the project. The interior reveals its internal organization through the gradually transforming relationships it forms to the human body moving through the space. In addition, this internal organization is adapted to site constraints and the environment that it operates within. Elegance is achieved when, rather than allowing external constraints to alter and compromise the internal organization, the internal organization is manipulated and transformed to adapt to external constraints. Again, this requires a developed design and aesthetic sensibility: reliance on technique alone yields average buildings.

During the process of learning and mastering technique, a fineness of manner and expression develops through the cultivation of a refinement, exactness and precision that incorporates form, space and movement of the body. The projects that result are highly customized.

Once repertoire and technique are controlled through coordination, formal features allow for gracefulness and movement to reveal the precision and mastery achieved with specific techniques. Through its graceful aspect, the external appearance of the form allows the internal organization and its sophistication, experienced in movement through the space, to be perceived. There is a seamless transformation between internal and external organization, that puts the internal techniques and their mastery on display externally.

Elegant structures possess formal features and material articulation sufficiently rich so as to emphasize the realm of bodily sensation. This is also developed through the techniques and procedures used in the design. Buildings that achieve the possibility of producing elegant sensations have particular characteristics formally, including *presence*, *formal balance*, *refinement of features and surface*, *and restrained opulence*.

An elegant building needs to have a framework against which its *presence* is read, and at the same time, must participate as an

所以,设计行为并非由单一的美学目的决定,而是建筑师在通观全局,将项目所受各种限制与项目目标进行综合考量之后作出的决定。创造优雅的作品需要不同层次的设计智慧,这些设计智慧中自然地融入了对组织结构与空间层面的考量。

从组织结构上来看,建筑师精确控制用途与潜能这对概念,由此创造出一种直观的关系,并赋予功能这个传统概念以全新的定义。在这个全新的定义中,用途与潜能带来的直观关系是通过使用者与空间的持续互动而产生的。

空间配置和组织结构行为这组标准与建筑项目的形态相关。建筑物内部空间可以逐渐改变它与其使用者之间的关系,从而展示出其内部结构。除此之外,这种内部结构还受到场地的限制,随环境的改变而变化。为了实现优雅,我们需要控制和转换建筑的内部结构来应对外部的制约,而非让外部的制约来改变和破坏建筑的内部结构。这同样也需要不断调整设计方案以及对美的感性认知:单纯依赖技法只会设计出平庸的建筑作品。

在学习和掌握技法的过程中,建筑师要培养起一种精美、精确和精准的观念,这种观念中融合了形态、空间以及人体移动等因素。通过这样的方法,设计师形成了一种精致的建筑表现手法。由此创造出的建筑项目必能充分体现客户的需求。

一旦我们将技能和技法相互协调、运用自如,建筑的形态特征就会变得灵动优美,能充分展示出技法的精湛与精准。优雅的建筑外观让人产生身临其境的感受,仿佛在建筑内部自由穿梭,去体会建筑的内部结构及其精致。这样一来,外部结构与内部结构实现了无缝转换,内部的技法及其运用在建筑的外部得以充分展现。

当对转换生成的空间布局加以优化时,如果建筑的形态看上去超越了重力束缚,那么建筑形态的协调就得以实现。如果将结构、系统和新材料以一种极其精巧的方式整合在一起,也许会创造出悬空

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extension of the field in which it operates.

Formal balance is achieved when the refinement of transformational spatial configurations achieves forms that seemingly defy gravity. An exceptionally sophisticated integration of structure, systems and new materials may allow for the form to appear suspended, or possessed of a particular lightness. In terms of formal appearance, this lightness includes qualities of fineness and daintiness, determined within the multiple individual elements that constitute the building design. The scale of the part to the whole needs to be attenuated, adjusted with precision and refinement, in order to produce the desired affect. If the scale of the part is too diminutive in relation to the whole, or if the whole is constituted of too many smaller pieces, then the viewer may be overwhelmed, and the potential of producing elegance is lost. When the relation of part to whole is attuned, elegant sensations — rather than chaotic ones — may be achieved at the point of transformation.

Crucial to the production of elegant sensations, the architect must design the project with the intention of elaborating *refined surfaces* to develop transformations between different formal features. The

的或相当轻巧的建筑形态。就外观而言,这种轻巧是由设计方案中的多个因素共同决定的,包括了精致与优美。根据精准与精美的标准,设计师缩减或调整某一部分在整体方案中所占的比例,以达到预期的效果。如果某部分在整体中的比例过低,或者那些构成整体的部分过于繁复,那么观者很可能无所适从,优雅也无从谈起了。调整部分在整体中的比例,也许在这种转换的过程中,优雅的感觉——就自然而然实现了。

要打造优雅的建筑作品,关键是建筑师在设计时必须下工夫打造精致的表皮,让不同形态特征相互转换。建筑师要去创造一系列独具特色的建筑形态特征,而这些特征在相互转换的过程中要保持相互关联,这样才能构成建筑形态的丰富性。在一个优雅的作品中,所有的特征都各不相同,而这些特征之间的转换也是渐变式的。不同特征之间的转换亦随建筑表皮的改变而变化。这些发生变化的区域就成了那些按照规

