

迪拜1号，迪拜，阿拉伯联合酋长国

1 Dubai, Dubai, United Arab Emirates

建筑设计 Adrian Smith + Gordon Gill 建筑设计事务所

资料提供 Adrian Smith + Gordon Gill 建筑设计事务所

编校 朱晓琳



鸟瞰图

2008年，Adrian Smith + Gordon Gill建筑设计事务所在一个国际设计竞赛上赢得迪拜朱梅拉公园开发的一系列大型项目的设计。其中最大的是迪拜1号，由3个高度不等的超高层塔楼叠加交错，并在接近底座处合为一体，它将成为世界上最高和最大的建筑之一。这3座塔楼至少有600m高，而其中最高的一个达到1 000m。

迪拜1号的三足鼎立的基底从运河之上升起，在中心形成一个沙漠中的绿洲。从那里，大众的视线焦点将凝聚在处于3个塔楼中间的雄伟壮观的中庭空间。夜色降临时，一束巨大的光柱——视觉上的“第四个塔楼”穿过中庭冉冉上升，像灯塔一样照耀着城市的中心。

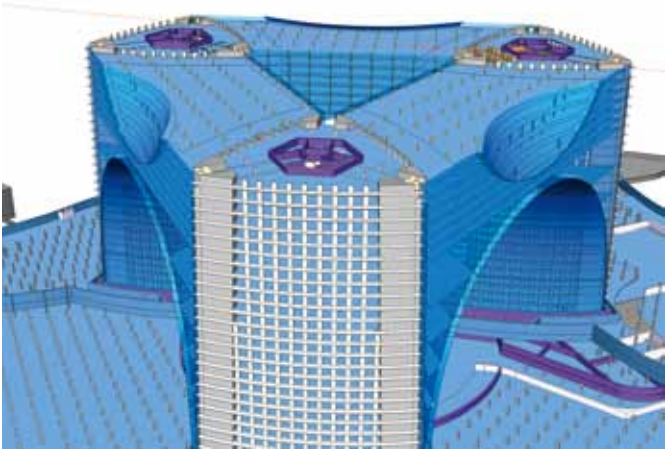
在特别情况下，浮动的舞台和环绕它周围的驳船将增加一倍的观众席位，使绿洲变成世界上独一无二的大型活动和表演场所。最先进的声、光显示设备将巨型全息图象投影到马赛克似的玻璃及铝合金的建筑外墙面上。

当塔楼向上逐渐缩小时，一系列3层楼高的天桥（空中广场）在空中相互连接加强了塔楼的稳固性，同时也成为人们欣赏壮观的城市和海湾景色的空中观景平台。

In 2008, Adrian Smith + Gordon Gill Architecture won an international competition to design several large-scale projects as part of the Jumeira Gardens development in Dubai. The largest of these was 1 Dubai, a trio of supertall towers of staggered heights (each at least 600 meters, with the tallest tower up to 1 kilometer) joined near the base, creating one of the tallest and largest buildings in the world. A city within a city, this giant mixed-use project was designed as the centerpiece of Jumeira Gardens and of Dubai itself. On its tripodal base, the 1 Dubai design rises over a canal that forms an oasis in the center. From there, viewers can gaze up through the great atrium-like space between the three towers. At night, a giant beam of light—a virtual “fourth tower”—lances up through the atrium, a shining beacon at the city’s center. On special occasions, the oasis transforms itself into one of the world’s most unique event and performance spaces, with a floating stage surrounded by barges doubling as seating banks. State-of-the-art sound and light shows feature giant holograms projected in the air and on the building’s mosaic-like glass and aluminum skin. High above, a series of three-story skybridges—essentially plazas in the sky—connect and help stabilize the towers as they taper upward. They also feature sky terraces with breathtaking views of the city and the Gulf. The mixed-use program of 1 Dubai includes two world-class (five- and six-star) hotels, office and retail space and some of the world’s highest condominiums—including a number of exclusive, double-height penthouse units in the top levels of the three towers. In corner penthouse units, columns have been removed at the corners for unobstructed views. The tallest tower also features one of the world’s highest exclusive club/observation halls.



可供游船行驶的建筑底部环境



建筑底部基座结构

迪拜1号是一座综合体，功能包括两个世界级的酒店（五星级和六星级）、办公楼、零售商业空间以及世界上最高的公寓住宅。此外，在3座塔楼的顶部阁楼层还设置了两层高的豪华复式单元公寓。为了让景观一览无余不受遮挡，取消了位于转角处的阁楼式豪华复式单元内的转角柱，并在最高的塔楼内设立了世界上最高的专用会所和观景台。

开发商Meraas的最初设想是建设一座可以观赏迪拜的世界最高建筑，即由Adrian Smith在Skidmore, Owings & Merrill时设计的迪拜塔—双塔综合体（Burj Khalifa—formerly known as Burj Dubai）。设计团队探索了这一可能性，但是Smith和Gill从XYZ大门项目（Smith较早期的一个构思）得到灵感和启发，决定创造一个由3个高度不等的超高层塔楼交错布局，在接近基座

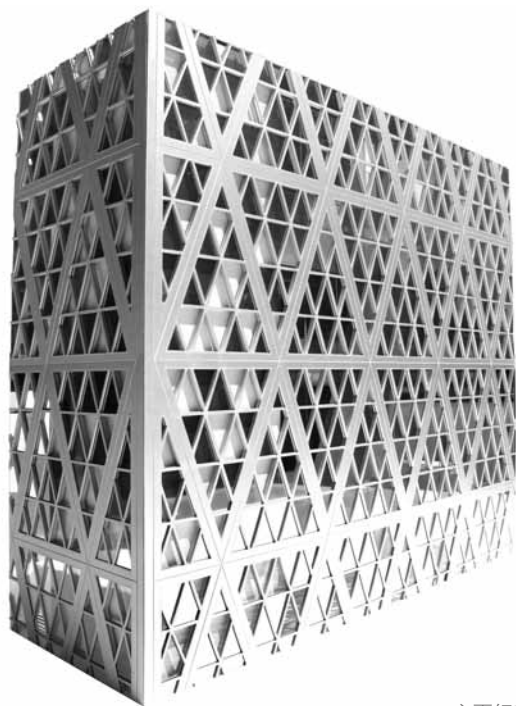
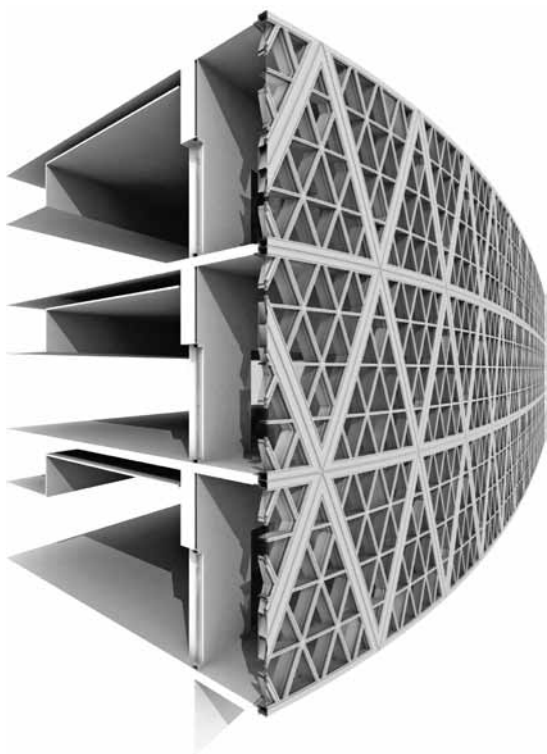


自然采光

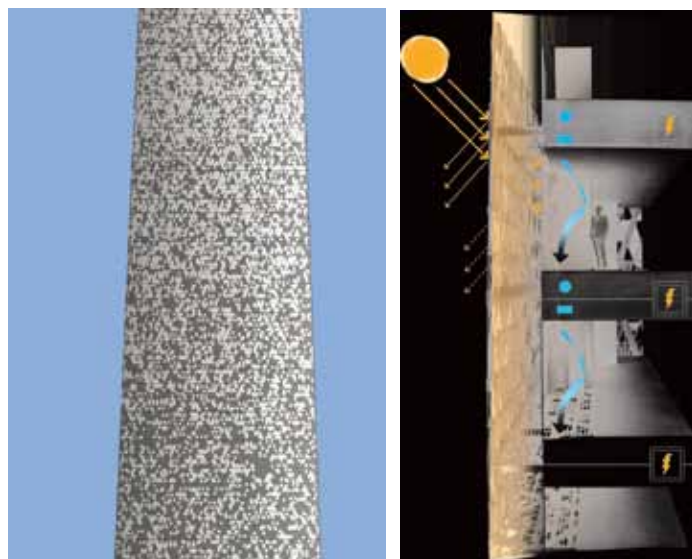


高塔之间的天桥

The original vision of the client, Meraas Development, was of a two-tower complex that would frame views of the nearby Burj Khalifa (formerly known as Burj Dubai), the world's tallest building, designed by Adrian Smith while at Skidmore, Owings & Merrill. The design team explored that possibility. But Smith and Gill, inspired by XYZ Gateway (an earlier speculative project by Smith at SOM), settled on a scheme with three supertall towers of staggered heights joined near the base by a vast saddle-like structure and, above it, by a series of skybridges. Although not what the client had envisioned, AS+GG's scheme won a design competition against four other top firms, including SOM. Supertall structures are prized by occupants and visitors alike for their ability to offer breathtaking views, and 1 Dubai offers more of these than any other building in the form of its great sky terraces atop the skybridges. The skybridges in turn connect and brace the complex's three towers, improving the structural performance of the entire development. The three-story skybridges also improve interfloor circulation between the towers; to transfer from one tower to another, the skybridges make it unnecessary to take elevators all the way down to the base.



立面细部及剖视图

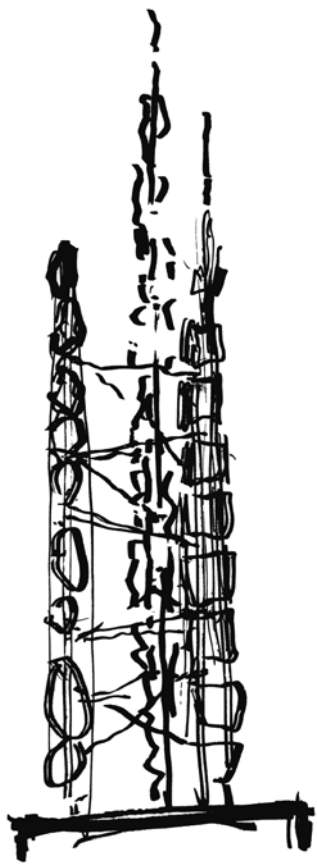


立面肌理

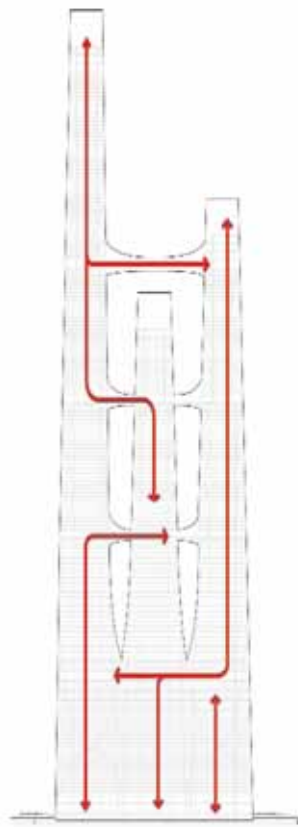
处由一个宽阔的马鞍型结构连结，并由一系列的空中天桥相连的建筑形态。虽然这一想法并不是业主的初衷，但是AS+GG的设计方案战胜了其他4家国际顶尖设计公司。

超高层建筑的最可贵之处是它能为使用者和来访者带来激动人心的景观，而迪拜1号天桥顶上的空中平台显示出更大的优势。这些天桥交替连接并支撑着3座塔楼组成的综合体，有力地体现出整体结构的表现力。同时，这些3层高的天桥也改善了楼层内的交通，从一个塔楼可以方便地进入另一个塔楼，不需要乘坐电梯从顶楼一直下降到基底。

迪拜1号另一个特殊之处是在马鞍形结构和天桥中间的“V”型开口所形成的“视觉中庭”。在马鞍形的结构之下，人们坐在运河的游船上通过中庭可以一直向上看到非同寻常的景像，这与在飞机上通过中庭向下所看到的景色同样不可思议！上层空中花



概念草图



交通系统分析

园的使用者可以从侧面观赏到不同的景色，同时下面运河中的观众也可以欣赏到水剧院的声光表演。

水剧院将是世界上最有特色的表演活动场所之一。当遇到特别需要时，水剧院的三边有浮动的驳船座位环绕。AS+GG与国际知名的艺术娱乐会场设计专家蒙特利尔的Scéno Plus公司一同合作，创造了这一声光表演剧场。用音乐、光和投影在舞台上空及周围建筑表面上的全息图像为观众带来欢愉和震撼的体验。

迪拜1号具有很多可持续发展的特点，其中最主要的是应对迪拜沙漠气候的研究和处理。在迪拜，夏季气温经常达到甚至会超过46℃，而玻璃表面的温度会更高。在设计过程中，对建筑现场的太阳方位角、大气湿度及风玫瑰图等进行了广泛深入的分析，特别是这些因素对塔楼的外墙和机电设备系统效率的影响。

迪拜1号将利用被动式可持续发展策略的一切有利因素，重点是获取自然采光和进行遮阳，以减少照明的能耗（这是一个主要的能源消耗，特别是在超高层建筑中）。其他策略还包括：在较冷的月份利用被动式的太阳能技术、最大化隔热的控制热值、自然通风，以及直接和间接的蒸发冷却。

正如迪拜塔一样，迪拜1号在设计上汲取了阿拉伯文化的精华。它的几何图案来源于伊斯兰文化和工艺品，包括马赛克、挂毯、地毯和屏风等元素，塔楼的铝合金和玻璃外墙上重复出现的三角形图案就是伊斯兰意念的抽象化和先进技术结合的最佳反

One of the most remarkable features of 1 Dubai is the great “virtual atrium” formed by V-shaped openings in the saddle structure and skybridges. Boats on the canal directly beneath the saddle have an extraordinary view straight up through the atrium, while passengers in aircraft above will have an equally remarkable view down through the center of the building. Users of the sky gardens on the levels above will be able to partake of the view from a slight angle, as will audiences enjoying sound and light shows in the water theater on the canal below.

The water theater will be one of the world’s most unique event and performance spaces. On special occasions, this great water theater is surrounded on three sides by seating banks on floating barges. AS+GG worked with the Montreal-based firm Scéno Plus, known internationally for its arts and entertainment venue designs, to create a vision for sound and light shows for the space. These would delight and astound audiences with music, lights and holographic projections in the air above the stage and on the surfaces of the building skin. 1 Dubai’s also boasts many sustainability features, most addressing the very significant issue of solar heat gain in Dubai’s desert climate. Temperatures in summer frequently reach and occasionally exceed 46 degrees Celsius, with temperatures on the surface of the glass rising even higher. In preparation for the design process, the building site’s solar orientation, humidity and wind patterns were analyzed extensively, especially in terms of their effect on the performance of the tower’s exterior wall and MEP systems.

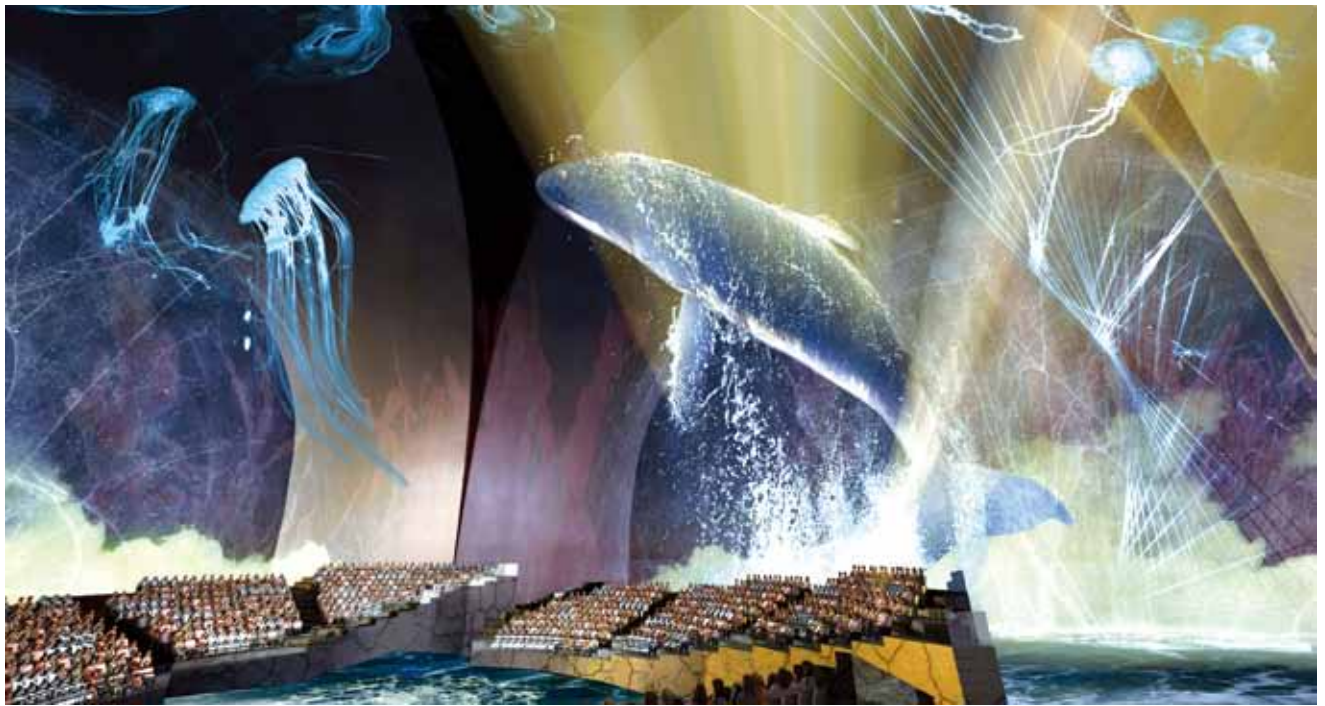
1 Dubai takes full advantage of a series of passive sustainability strategies, focusing on natural daylight harvesting (which reduces energy consumption for lighting, a major drain on resources especially in supertall towers) and shading. Other strategies explored for the project include passive solar heating in the cooler months; manipulation of thermal mass for maximum insulation values; natural ventilation; and both direct and indirect evaporative cooling.

Like Burj Khalifa, 1 Dubai was designed with specific references to Arab culture. The geometric patterns found in Islamic art and crafts, including mosaics, tapestries, rugs and screens—suggestive of infinity, a key concept in Islamic thought—find an abstract and technologically advanced reflection in the repetitive pattern of triangular figures in 1 Dubai’s aluminum-and-glass skin. The 1 Dubai building envelope design integrates cultural referencing with advanced technology to produce a high-performance, aesthetically rich result.

Specifically, the triangular and diamond-shaped figures of the geometry are derived and abstracted from Middle Eastern Mashrabiya latticework. This is realized by means of a diagrid, which uses diagonal support beams and requires about 20 percent less structural steel than conventional wall systems. Two primary options for the exterior wall were studied. In one, the exterior wall consists of a partially open outer scrim that blocks much of the harsh sunlight before it reaches a highly insulated and reflective inner vision glass wall. In the other, a second option for the skin was visualized as an unbroken glass curtain



60层平面



基座底部的水上剧院

映。迪拜1号的建筑外墙设计将文化渊源和先进技术结合创造了高效能和丰富的美学效果。

具体来说，三角形和菱形的几何图案是从中东地区的Mashrabiya格子衍生和提炼而来的，也可以认为是斜肋，即采用对角线的支撑梁，它比传统的幕墙系统要减少20%的结构用钢量。我们做了外墙的两个初步方案：一个是将灼热的阳光在到达高隔热反射的内层玻璃前，由部分开敞的外层网来遮挡；另一个是将外墙设想为一层不间断的玻璃帷幕。为了取得最大的景观和最小的太阳热量，可见玻璃板和半透明的高隔热玻璃按不规则的图案交替排列，这种方式也在室内产生了一种有趣的斑斑驳驳的阴影效果。

像迪拜1号这样极高又非同寻常的体型给结构提出了极大的挑战，并要求采用特别的解决办法。极端的高度要求采用巨大的柱子，但这会极大地减少楼层的使用面积，因此设计团队试图将荷载传导到塔楼的角落。从设计的角度来看，塔楼相当细长，如果没有中间的天桥和马鞍形的支撑是不可能实现的。天桥在3个塔楼之间传递剪力和外倾力，使之成为一个巨型的结构整体，实现共同的受力作用。

设计团队包括顾问公司RWDI和Halvorson and Partners进行了深入的风洞试验和分析，以减小风荷载对建筑物的影响。这些试验结果带来建筑体型微妙的改变和在建设场地上建筑布局方向的调整。基于试验结果，在3个塔楼的顶部设置了摆动阻尼系统。

遗憾的是，迪拜1号项目在2008年由Meraas Development在迪拜国际地产投资与开发博览会上公布，但由于受到迪拜经济的影响，目前本项目处于搁置状态。

wall. To maximize views while minimizing solar heat gain, vision glass panels alternate in an irregular pattern with translucent high-insulation glass, which also creates a dappled shading effect in the interiors.

A building as tall and uniquely formed as 1 Dubai presents special structural challenges and requires special solutions. The extreme height would have required very thick columns, significantly reducing usable floor space, were it not for the design team's plan to transfer the load out to the tower corners (visualized on the opposite page). The towers themselves, which the design team envisioned as quite slender, could not have been realized without the structural support of the skybridges and saddle. The skybridges in particular transfer shear and overturning movement between the three towers, allowing them to work together as a single megastructure.

The design team, which included consultants RWDI and Halvorson and Partners, also conducted extensive wind tunnel testing to minimize dynamic wind loading effects on the building. This testing led to a subtle re-shaping of the form and an adjustment of the building orientation on the site. The test results were also used to develop a design for pendulum damping systems at the top of each of the three towers.

1 Dubai was announced by Meraas Development at Cityscape Dubai in late 2008. The project is currently on hold due to ongoing economic conditions in Dubai.



Gordon and Adrian with model