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Feature 专题
Building Roof
建筑屋顶

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008 跳动的音符——青岛大剧院
Qingdao Grand Theater

白色的屋顶部位巨幅轻盈地漂浮在“钢琴”上面，白色透明的条板梁使其看上去犹如钢琴的键盘，依稀，灯光反射在条板梁上，好像一个跳动的音符。
A roof that is similar to a light and floating cloud surrounds this “architectural landscape”. With white plate beams it is just like the keyboards of the pianos.

020 风起云舞——台北表演艺术中心
Taipei Performing Arts Center

屋顶用玻璃和钢制成，如同风筝一样在风中飘扬，显得十分轻盈。
A glass & steel light coverage that alludes to the socio-functional unity of the complex is a Kite of Sound, dragged by the wind.

026 “合二为一”的屋顶建筑
Rooftecture O-K

大楼的上部被一个新的屋顶所覆盖，新的屋顶与立面合二为一，形成连续的带状结构。
The upper part has been covered with a new steel sheet roof and wall integrated into a continuous band.

032 会呼吸的屋顶——加州科学馆
California Academy of Sciences

科学馆的屋顶是它的最大特色之一，这个会呼吸的绿色屋顶堪称一条起于寻常的野生生物生态走廊。同时，屋顶的植物不需人工灌溉。
The new Academy's living roof is planted with native California species that will not require artificial irrigation. The native plants will provide habitat for a wide variety of wildlife.

038 流动的花园——“山”型住宅楼
The Mountain

所有的住宅都有向阳的屋顶花园，板野复广，屋顶花园包括平台空间和会随四季变换景致的花园。
All apartments have roof gardens facing the sun. The roof gardens consist of a terrace and a garden with plants changing character according to the changing seasons.

050 移景入室——埃里希萨特勒酒庄
Erich Sattler Winery

全开放式的屋顶平台俯瞰整个村庄，提供了欣赏葡萄园的360度视角，湖泊与阿尔卑斯山山麓的美景也一览无遗。
The fully accessible roof terrace above overlooks the village and offer a 360° view of the surrounding vineyards, the nearby lakes and the foothills of the Alps.

058 折纸状公寓
Ozuluama Residence

新建的屋顶犹如漂浮于地貌多变的墨西哥城上空的可移动建筑。
The new roof top appears like a nomadic structure floating above the diverse urban topography of Mexico City.

064 格子屋
Grid House

清晰、精确的木质网格栏格构与小峡谷相得益彰，将场所原有功能发挥了出来。人们可以穿梭于木质网格结构之下和外部长走廊或绿色屋顶上。
Clear, precise, the wooden grid fits into a small valley to promote the spot's original function. One can walk beneath the grid, on its long external aisle, or on the green roof.

074 微风引擎——招待所、职工度假和培训中心
Breeze Engine—Hostel, Company Retreat and Training Center

凸起的屋顶遮蔽了整幢建筑，也低位于卧室上方的双层屋顶空间，这样的设计可以很好地阻挡阳光所带来的热量。
The raised roof casts shade on the entire building including its double layer roof space above the bedroom level, thereby reducing the considerable heat load from sun exposure.

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080 睡魔节博物馆
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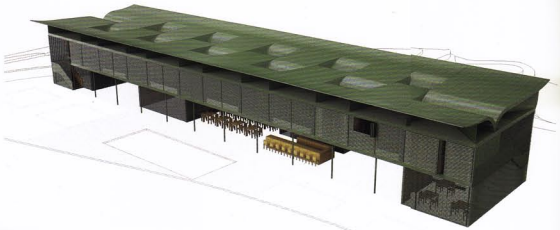
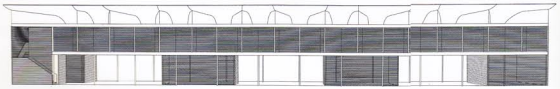




Breeze Engine | 微风引擎 |

Hostel, Company Retreat and Training Center

——招待所、职工度假和培训中心 | Zoka Zola |

“微风引擎”是一幢位于亚热带的大楼，它被视为一处天然的通风设施——座没有马达的微风引擎。

精益求精

项目通过一系列发明实现了高度优化——就如同从早期滑翔机时代发展到飞机时代——而每处构件设计的特征，造型和功用相互之间密不可分。

相信这种进化能得到独一无二的美学品质和先进的技术——就像特斯拉感应电动机，坎姆斯椅或哥特式教堂。

微风引擎

为了实现建筑的自然通风，必须优化它特殊的场地环境和对室内和室外空间的要求。

1. 地点

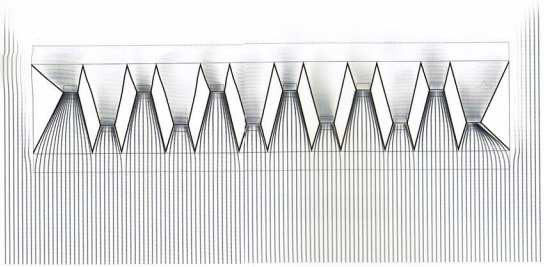
基地位于中国南部一处森林密布的岛屿之上，建在山谷的下坡段，面朝大海。

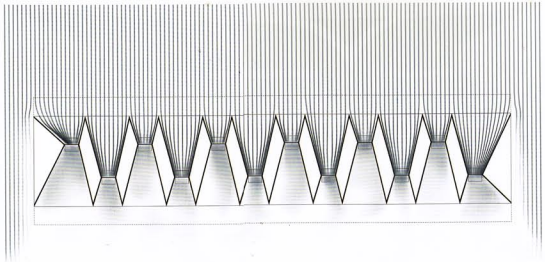
2. 气候

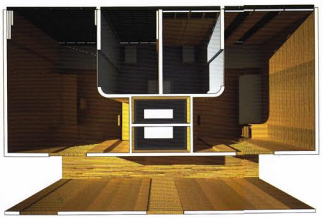
中国南部为亚热带气候，与中国东部、美国东南部以及世界其他地方十分相似，这里四季如春，十分潮湿。

3. 微气候

在自天东南风和夜晚北风的吹拂下，森林树木婆娑影动。







4. 功用

这里是职工招待所，培训中心和家庭度假所，也是老年人和残障人士的假日寓所。

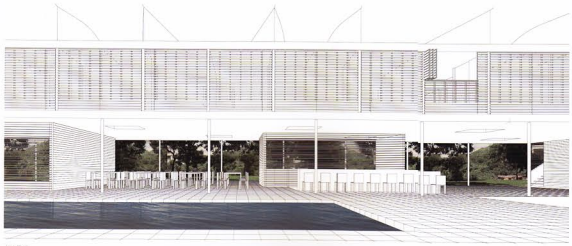
为了保持更好的通风和安全，24间额定的卧室全部位于一楼以上。而诸如饭店，酒吧，客厅以及会议间皆位于底楼，结合了室外空间以及周围的游泳池和烧烤区。

5. 客户和他们的目标

客户是一位知名的国际地产开发商。而项目规划也体现了他们对环保和绿色建筑的追求。

6. 大楼形态和朝向

大楼呈东西朝向，确保最佳的采光和通风。由于房屋朝向的缘故，需从结构入手对大楼进行规划，尤其是大楼沿线的采风，凸起的屋顶遮蔽了整幢建筑，包括位于卧室上方的双层屋顶空间，这样的设计可以很好



水池景观
View from pool

地遮挡阳光所带来的热量。

7. 优化通风

自然的通风装置。

(1) 空气动力学风斗屋顶

(2) 置于双层屋顶内的通风管

(3) 通风立管

(4) 建筑表面布满通风孔

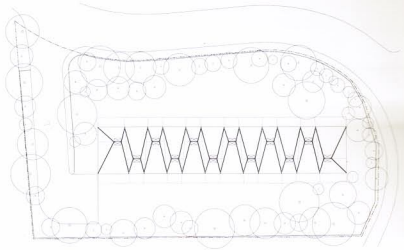
主要途径——风斗和抽风机

房屋构件的格局，设计以及方位不能对通风产生阻碍，所以需要满足以下两个条件：

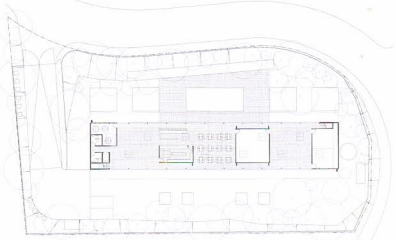
(1) 白天有持续南风涌入

(2) 夜间有持续北风涌入

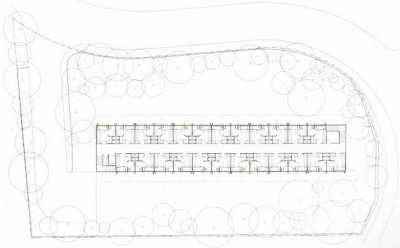
屋顶平面图
Roof plan

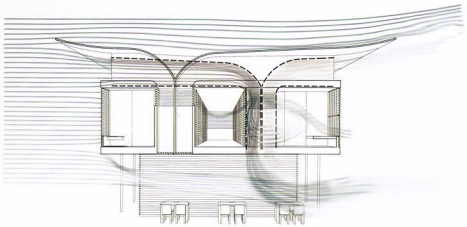


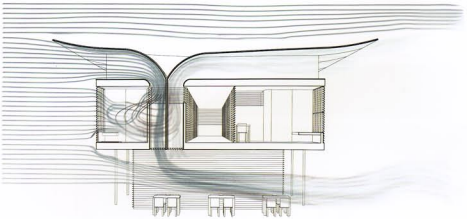
一楼平面图
Ground floor plan

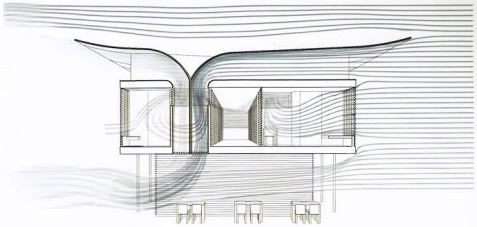


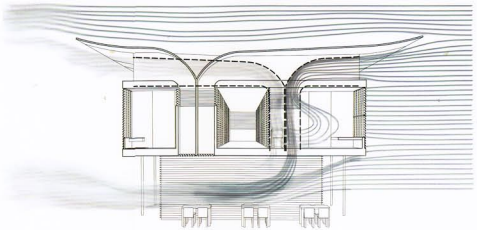
二楼平面图
First floor plan











"Breeze Engine" is a building in subtropical climate that is developed as a large natural ventilation equipment—a motor-less breeze engine.

High Degree of Optimization

The project is developed to achieve high degrees of optimization that are achieved through a series of inventions—similar to the inventions and optimizations leading to human flight from early gliders and flying machines to the airplane—where characteristics, shape and use of each element is in a tight interdependent relationship with every other element.

It is believed that optimization, at its best, results in unique aesthetic qualities, ingenious and admirable technology—think Tesla's induction motor, Eames chairs or gothic cathedrals.

Breeze Engine

In order to rely on natural ventilation the building has to be optimized to its specific site condi-tions and to its program demands for indoor and outdoor spaces.

1. Location

The site is in a valley sloping down to the sea on a forested costal island in Southern China.

2. Climate

Southern China has a Subtropical climate similar to most of east China, the Southeast of the U.S. and other areas of the world. Hot, warm and humid climate can be expected throughout most of the year.

3. Microclimate

Daytime breeze from the south and nightime breeze from the north moves over the tree crowns of this forested site.

4. Use

A hostel, a training center, family retreat for corporate employees, and a vacation retreat for organization of elderly and disabled people are uses of this building. The 24 required bedrooms are all one floor above ground level for better ventilation and security. Common spaces like restaurant, bar, living room and conference rooms are all on the ground level; thus integrated with the outdoor spaces on the site and the surrounding grounds, including the swimming pool and barbecue areas.

5. Clients and Their Ambition

The client is a significant international real estate developer. Their project is to showcase the client's commitment to the environment and to be the greenest building in the region.

6. Building Shape and Orientation

The east-west orientation of the building ensures minimization of heat gain while providing the best exposure to air movement. The orientation allows us also to develop the building from its section, essentially extruding the principle of capturing air along the length of the building. The raised roof casts shade on the entire building including its double layer roof space above the bedroom level, thereby reducing the considerable heat load from sun exposure.

7. Optimized Ventilation

The natural ventilation scheme of

(1) Aerodynamic profiled wind-scoop roof

(2) Air channels in double layer roof

(3) Air stacks

(4) Louvered surfaces to air stacks as well as all around the building skin

Works in two main ways—as wind scoop and as air extractor

The organization, design and location of these elements are optimized to avoid any "shading" from air movement. It is therefore optimized for the two mainly occurring scenarios:

(1) Constant day-time breeze from the south

(2) Constant night-time breeze from the north

Credits

MEP Engineers: Vincent Cheng, Trevor Ng, Mark Richardson of Arup

Structural Engineers : Andrew Mole of Arup