

世界建筑大师优秀作品集锦

THE MASTER ARCHITECT SERIES II

Norman Foster

Selected and Current Works of
Foster and Partners

诺曼·福斯特

中国建筑工业出版社
China Architecture & Building Press



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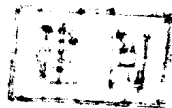
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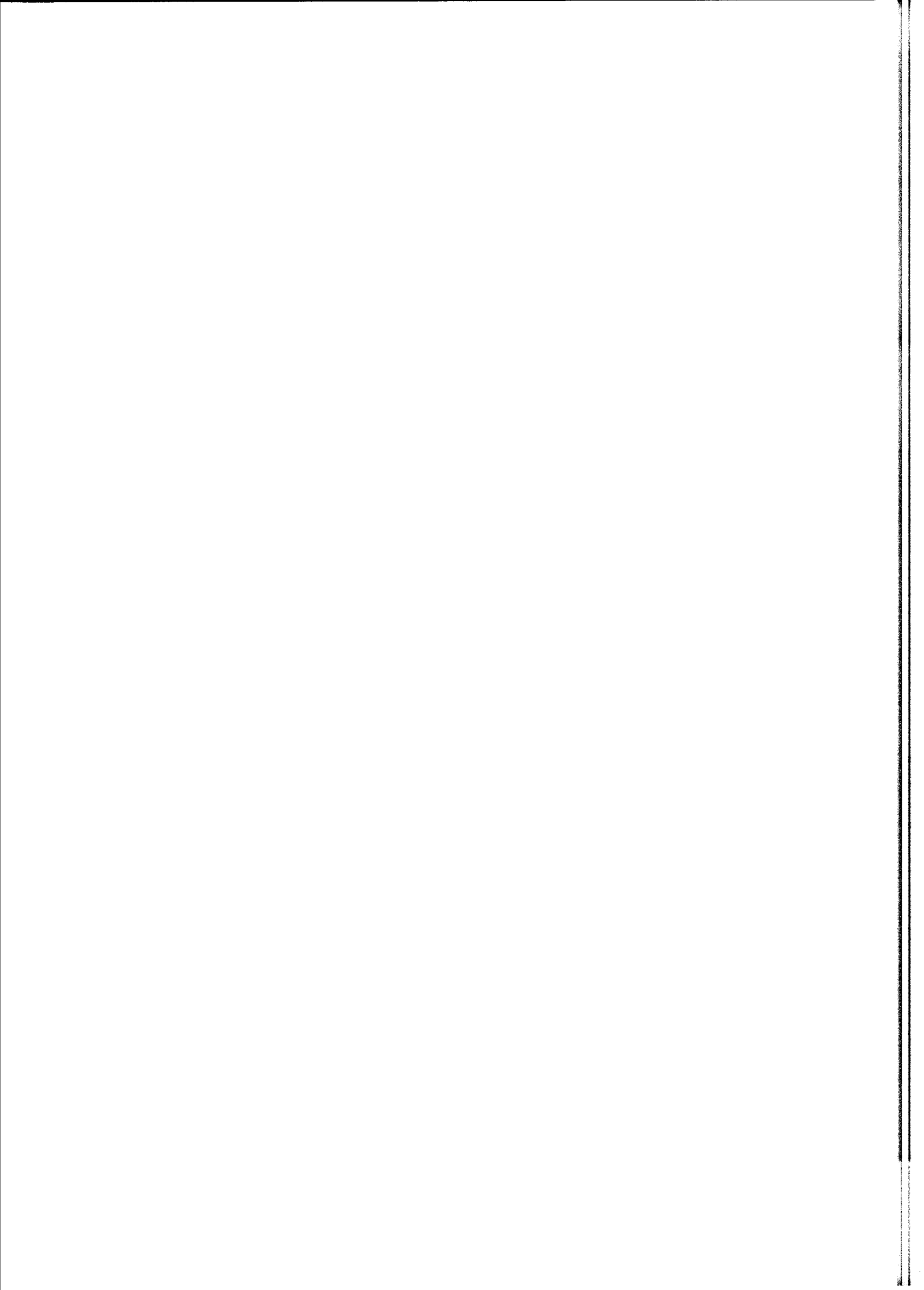
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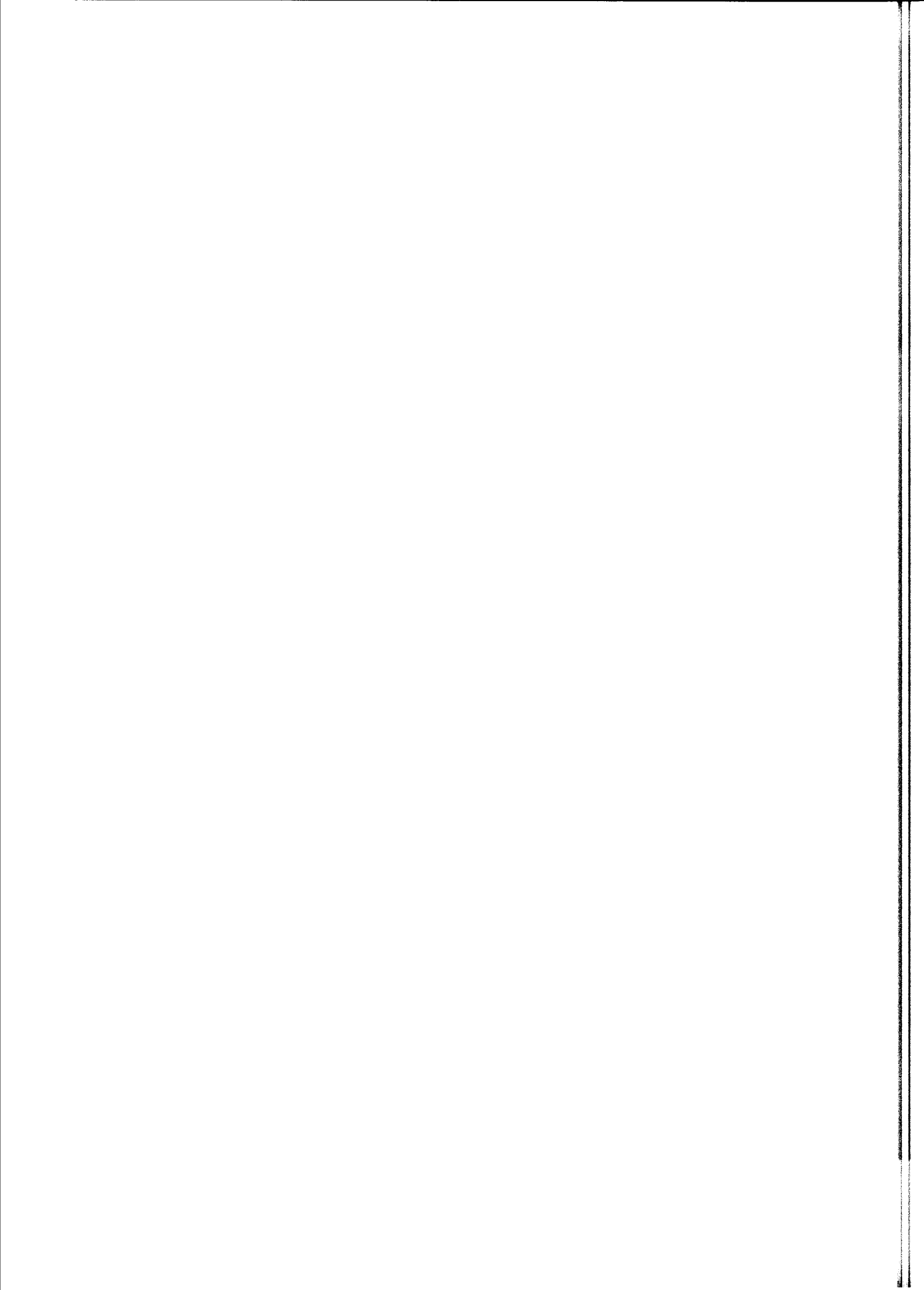
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INTRODUCTION

绪 论

This publication coincides with the celebration of more than 30 years of practice in architecture and design. My colleagues and I, under one title or another, have worked together on several hundred projects since the mid-1960s. The selection of buildings and projects illustrated in this book reflects the type, range and scale of work undertaken over this period. More significantly, the process of reviewing these projects has caused me to reflect upon the consistency of approach that underpins this diverse and varied body of work. The benefit of hindsight, and a degree of post-rationalisation, allow me to trace a pattern of thinking, an attitude to the process of design, that weaves its way through many of our projects. One part of this can be defined as an interest in the invention and re-invention of the building type. Another part relates to integration. For me, the optimum design solutions integrate social, technological, aesthetic or economic needs which are often in conflict.

At a personal level, I confess to being obsessed with invention. Part of this obsession is a fascination with inquiry—with “going back to basics”. I have to understand the underlying principles of a problem in order to question the traditional response and identify if there is an opportunity to invent or re-invent a solution. Together with my colleagues, I design buildings in the hope that they take forward the boundaries of knowledge and experience of each particular building type.

Airports—a new typology

When we were confronted with the challenge to design London's third airport at Stansted, the client defined the needs for a new generation airport: a structure that would cost less to build and run, would work better than previous airports and would also offer greater security. While nobody could dispute the importance of these goals, for me the new generation airport also had a very strong social imperative. Ideally it should help to turn the experience of air travel from one of misery to one of delight—to try to rediscover the friendliness, orientation and sense of occasion that had typified great terminals of the past, particularly in the railway age.

The conventional solution to the airport building type which has developed since World War 2 is a box with a highly serviced roof structure which contains or supports large amounts of machinery and equipment. The effect of this top-heavy solution, full of ductwork, pipes and electric lighting, has been dark and congested environments which are hostile to the users as well as being difficult to service and maintain without disrupting passenger movements. The resulting concourses are almost black boxes and create a spiral of energy consumption. Artificial lighting adds to the heat load from people and increases the demand for cooling which consumes yet more energy. This in turn requires more equipment and a more expensive structure to support it.

At Stansted we questioned the appropriateness of this “conventional wisdom” and, after much research and analysis, ended up literally turning the problem on its head. All of those services normally housed on the roof are far better placed in an undercroft below concourse level where they are out of sight and easier to maintain. The lower level also accommodates the baggage handling systems, creating a logical separation of baggage at ground level and passengers above—exactly where each needs to be to connect with the aircraft that serve them.

The undercroft is a large-scale equivalent of the floor void in a modern office building. In both cases the objective is to provide flexibility for change over time. In the case of an office, it might allow changes in the wiring or the introduction of new fibre optic

此书出版正值纪念我们在建筑和设计领域从业30多年之际。自60年代中期以来，我和我的同事，在不同的事务所名称下，已共同设计了几百个工程。书中介绍的建筑和工程反映了这期间承担的项目的类型、范畴和规模。更重要的是，回顾这些设计项目的过程促使我深入思考产生这些各种各样的作品的一贯的设计方法。事后反省的好处，以及一定程度的后理性化，使我能够去追寻在我们许多设计项目中的思维模式，即贯穿于设计过程的一种观念，其中一部分可以被确定为对建筑形式的创造和再创造的兴趣，另外一部分可归结为综合的结果。对我来说，一个最佳的设计成果通常是综合了相互抵触的社会的、技术的、美学的和经济的需求。

从个人角度而言，我承认自己一心追求创造。这种执着，部分是由于对探索的迷恋，即“回到事物的基本原则”。为了质疑传统的对策并确定是否有机会创造或再创造解决问题的办法，我必须弄清构成问题的一些最基本的原则。我与我的同事，在设计时总是希望能够超越每一种特殊建筑形式的已有知识和经验的局限。

机场——一种新的类型学

当我们面临设计位于斯坦斯特德的伦敦第三机场的挑战时，业主确定了一个新一代机场的要求：这个建筑比起以前的机场，其建造和运转的费用要更低，运转得更好，安全更有保障。没有人怀疑这些目标的重要性，然而对我来说，新一代的机场同时具有非常强烈的社会要求。理论上讲，它必须有助于将航空旅行从一个烦恼的过程变成一种轻松愉快的体验，也就是要努力重新发掘友好感、方位感和场所感，这些代表了从前、尤其是铁路时代大型车站的典型特征。

二次世界大战以后机场建筑形式的传统设计方法，是一个有着高度设备化的屋顶结构的方盒子，它容纳或支撑着大量的机器和设备。这种充斥着管道、电器照明设备的头重脚轻的解决方法，其效果是给使用者带来不友好的黑暗和拥挤的环境，同时，设备的维修和保养常常影响旅客的行动。结果，各个大厅几乎都是些黑房间，并且消耗大量的能源。而人工照明增加了原来仅是人体散发的热量带来的热负荷，加大了对制冷的需求，又消耗更多的能源。这样一来又需要更多的设备来满足，需要更昂贵的结构来支撑设备。

在斯坦斯特德机场的设计中，我们对此种“传统知识”的正确性提出质疑，经过了大量的研究和分析，最终将问题集中在建筑的顶部。所有那些通常安装在屋顶的设备，如果安放在大厅下面的地下层，情况会好得多。在那里，不仅人们的视线看不到，而且也更容易维修保养。地下层同时容纳行李传送系统，形成下层的行李和上层的旅客之间一个合理的分流——实际上两者都需要与所要搭乘的飞机联系起来。

地下层相当于一个大尺度的现代办公建筑的楼层空间。在两种情况下，其目的都是为了在将来情况变化时具有灵活性。对于办公建筑，它也许要适应电线线路的改造，或者是新的光纤纤维信息技术的引进。在斯坦斯特德机场这样尺度的建筑，允许在已

information technology. At the scale of Stansted it allowed a main-line railway station to be inserted when the building was already under construction. The undercroft also provides easy access to the air-conditioning plant, chillers, lighting, and other equipment that requires regular servicing and more frequently needs to be replaced.

The concept of servicing the spaces from below offers wonderful spatial benefits. The clutter of pipes, ductwork and light fittings—as well as the problems of suspended ceilings—are gone. Instead there is the formal clarity of structure and the joy of natural light. The roof is in effect a lighting screen which also offers protection from the elements. Its appearance is deceptively simple and belies the many hours of creative struggle to model and develop the final concept.

Although the levels of natural light are high and have resulted in dramatic energy savings, the glazed roof openings occupy a mere 5 per cent of the total area. Solar gain is reduced by the perforated metal panels suspended below the openings. As well as being sculptures in space, these kite-like panels also perform other important functions. By reflecting natural light back onto the surrounding surfaces of the structural vaults, they visually lighten the entire roof, enhancing its floating appearance. At night they mask the “black hole” effect of the roof openings above them and, when artificially lit from the base of the structural trees, they help to reflect light back into the space. Significantly, they are also designed to allow controlled shafts of sunlight to penetrate, bringing the floors to life with patterns of light and shade.

The undercroft also had other environmental benefits. It enabled the building to be partially buried into the slope of the site so that on the land side it would fit more comfortably into the rural landscape, comfortably below the existing tree line. This was not only socially desirable, but it was also a political necessity. The location of London's third airport had been subject to many years of indecision and policy changes; over time, the issue of environmental impact had grown in importance so that it was vital to develop a design which was sensitive to these concerns.

Only by questioning the basic principles of airport design did we succeed in coming up with a solution that works more efficiently than the traditional model, as well as having clear spatial and economic benefits. The inverted building type is a re-invention of the airport typology. This strategy has informed a number of other airport projects developed by our studio for Bangkok and Shanghai and has been further refined at Chek Lap Kok Airport in Hong Kong. While Chek Lap Kok stretches the limits of the building type—in terms of scale, legibility, construction and implementation—it is Stansted's radical spatial and tectonic structure which has pushed forward the boundaries in the field and has been widely adopted by other designers and client organisations, leading to a new generation of airport terminals around the world.

Workplace—the social imperative

A similar quest for innovation has generated radical solutions for the workplace, from factories to offices and corporate headquarters.

As early as 1966 our project for Reliance Controls broke the mould of traditional factory buildings in the quest to improve working standards in the new electronics industries. It did this by questioning the segregated model of “management box and workers' shed” with its implications of “we and they”, “posh and scruffy”, “front and back”, “clean and dirty”. Instead, a democratic pavilion was proposed with a single entrance, uniform standards throughout and flexible open space which could be changed over time, according to the varying demands of production and administration.

经进行施工时插入一个干线火车站。同时，在地下层也能方便地接近空调设备、冷却器、照明系统，以及其它一些需要定期维护和频繁更换的设备。

从下层为航站楼大厅提供设备的构想带来了绝妙的空间上的益处，凌乱的管道、线路和照明装置，以及悬挂天花板的问题，都不存在了。取而代之的是结构形式的清晰和天然光的趣味。屋顶实际上是一个照明屏，同时使室内免受外界天气的影响。它的外观看上去很简单，似乎觉察不出设计推敲并形成最终方案是经过了无数个小时创造性的努力。

尽管玻璃天窗的面积仅仅占了总面积的 5%，但室内自然采光的程度却很高，并节约了大量的能源。悬挂在天窗下的带孔金属板减少了阳光直射。这些像风筝一样的金属板，既是空间的雕塑，也具有其他重要的功能。它们将自然光反射到四周结构拱顶的表面，照亮了整个屋顶，加强了屋顶悬浮的视觉效果。夜晚，它们不仅掩盖了屋顶天窗的“黑洞”，而且，当树状结构底部的人工光源将其照亮时，有助于将光线反射到室内空间。特别是，这些金属板的设计，考虑使经过控制的太阳光束穿透进来，用光和影的图案为地面带来勃勃生机。

地下层也带来了其他环境上的益处。它使建筑部分地埋入到基地的缓坡之中，这样在地面它能非常不显眼地融入到乡村景观中去，很和谐地掩藏在原有林冠线之下。这不仅是一个社会需求，而且也是一种政治上的需要。伦敦第三机场的选址经过了多年的迟疑不决和政策变化，同时，随着时间的推移，对环境的影响这一问题也变得越来越重要，因此，形成这样一个考虑了相关问题的设计方案是审慎的。

仅仅通过对一座机场的基本原则提出怀疑，我们便成功地引出了一个比传统模式效率更高的解决方案，同时具有明显的空间上和经济上的优点。这一反向设计的建筑型式是对机场建筑形式的再创造。这个思想已渗透在我们事务所承担的许多其他机场项目中，如在曼谷和上海，并且在香港的赤臘角国际机场得到进一步完善。虽然赤臘角国际机场在尺度、功能、结构和实施方面突破了这种建筑形式的限制，但是实际上是斯坦斯特德机场先进的空间和建筑结构拓宽了这一领域的局限，并被其他设计师和业主机构所广泛采纳，在世界范围内将机场航站楼带入一个新的时代。

工作场所——社会必要性

类似的创新的追求为工作场所带来了先进的解决方案，从工厂，到办公楼，到公司总部。

早在 1966 年的信托控股公司的设计，我们就探索了在新的电子工业中如何改善工作条件，打破了传统工厂建筑的模式。它对“管理区和工人区”隔离的模式，以及其中暗含的“我们和他们”、“讲究和邋遢”、“前台和后台”、“整洁和肮脏”提出疑问。与此相反，我们提出了一个民主大厅的方案，只有一个入口，整个建筑的标准是统一的，还有可根据生产和管理的不同要求在将来能够改变的灵活的开放空间。

This process of “back-to-basics” questioning was central to the design concept of the Willis Faber & Dumas headquarters developed in the early 1970s when most offices were compartmentalised into individual cells or large shopfloor spaces. Discussions with future users identified the desirability of collective space—something that could re-establish a sense of community within a growing company. Our response was to turn the entire circulation system of the building into a single social space by drawing the main escalators through an inclined atrium with natural top light, situated in the heart of the building. I can remember the company secretary, Ken Knight, standing in this space and explaining how it worked to groups of visitors. He would describe how I had rejected the idea of lifts in the new building on the grounds that they were antisocial, and how I had proposed escalators instead. He then went on to explain that in their previous offices everyone would avoid eye contact in the lifts, but here in Ipswich it was a different story. Everyone greeted each other in the morning as they rode the escalators and exchanged pleasantries during the day. For him it brought back the spirit of the family firm in the days when it was much smaller, and re-established the identity of the company.

While I am delighted that the building is today celebrated for its formal and aesthetic attributes (like nearby Ely Cathedral, it was recently protected by a Grade I listing), I still find its social and technical diagram the most compelling and rewarding aspect of this milestone project.

The headquarters building for the Hongkong and Shanghai Banking Corporation takes some of these themes further; for example, almost all the floors are connected by escalators, which is unique in a high-rise building. But more importantly, the desire for a powerful public symbol and flexible business space led to the invention of a new form of spatial organisation. Before this building, every skyscraper had a central core which accommodated services and vertical circulation. The design for the Hongkong and Shanghai Bank broke this tradition by fragmenting the core and dispersing it to two of the four edges.

This plan creates better office spaces with views in two directions and an unbroken line of sight from one side to the other. Another benefit is that, unlike the single extrusion of a central core building, the bank's profile on the skyline can change, creating deep spaces at the base and slimmer spaces at the top. Vertically, the scale of the building is broken down by double-height reception areas served by high-speed lifts. The result is a series of village-like clusters, one above the other, rather than the anonymity of a traditional office tower.

Without the interruption of a solid core, the spaces are also far more adaptable to change. This flexibility has been put to the test by the many departmental changes which have occurred since the building first opened. In the past, these would have involved considerable upheaval while building work was carried out: instead, they have been achieved by the bank's own staff during a weekend operation. More recently, the bank has been able to incorporate a large dealers' floor into their tower, something which none of their competitors has been able to achieve in a high-rise headquarters building.

Another key generator of the bank's design is its relationship to the public realm and the city. The building is lifted off the ground, creating a generous, protected civic space at the crossroads of central Hong Kong. The original notion that this large institution should “give something back” to the city has become a tangible reality over the last few years. During the working week the space acts as a formal meeting place and a glass showcase to the process of banking.

这种“回到基本原则”的质疑过程是70年代早期的威利斯·费伯和杜马斯公司总部的设计概念的核心。当时大多数的办公楼都被分隔为许多单独的小房间或者大型的工场空间。经过与未来使用者之间的讨论，我们确定了这个建筑需要一个集中的空间——在一个蒸蒸日上的公司内它能重新建立一种社区的感觉。我们的方案是引导乘自动扶梯的人穿过一个有自然顶光的中庭，将建筑的整个交通系统改变成一个位于建筑中心的单一的社交空间。我还能记得公司的秘书肯·耐特先生，站在这个空间里，描述它是如何打动众多的参观者的。他讲起我是如何拒绝在新建筑中安装升降电梯，理由是它们是反社会的；以及我又怎样提出了以自动扶梯来代替的方案。然后他继续谈到在他们以前的办公楼内，每个人都避免在电梯里的目光接触，但是在这儿，在依波斯维奇，情况完全不同。每个人在早晨登上自动扶梯时互致问候，并在一天中相互说些轻松打趣的话。对他来说，它带回了当年规模要小得多的家庭企业的精神，并重新树立了公司的个性。

虽然，我很高兴今天这栋建筑的造型和美感得到大家的称赞（像附近的伊拉尔大教堂一样，它最近也被列入一级保护名单），但我仍然认为，社会思想和技术手段才是这个里程碑工程最值得重视和最有意义的方面。

香港汇丰银行总部大楼发展了这些主题中的一部分。例如，几乎所有的楼层都通过自动扶梯联系，这在高层建筑中是独一无二的。但更重要的是，由于需要强有力的公共象征和灵活的商业空间，建造了新型的“空间组织”。在这座大厦之前，所有的摩天大楼都有一个容纳设备和服务交通的中心核。香港汇丰银行的设计打破了这一传统，将中心核分裂开，分散到建筑四边中的两条边上。

这一方案创造了独特的办公空间，能看到两个方向的景色，从室内的一端到另一端视线不受阻挡。另一个优点是，不同于中心核建筑只有单一的突出屋顶，这座银行的天际轮廓是可变的，在建筑的底部创造了大进深空间，在顶部创造了细长空间。在垂直方向上，建筑的尺度被双层高的接待区打破，通过高速电梯可达接待区。其结果是产生了一系列村落般的办公组群，一组位于另一组之上，不像传统的办公塔楼那样混乱无序。

如果不打破实体的中心核，空间将远不如现在那么灵活多变。这种灵活性已受到自建筑揭幕以来的多次部门变化的考验。在过去，这种变化带来的施工将引起相当的混乱；而现在，这些通过银行自己的职员在一个周末的工作就完成了。最近，银行在这座大厦里安排了一个大型的证券大厅，而他们的竞争对手中没有一个能在一座高层的总部大楼内做到这一点。

汇丰银行设计的另一个重要的构思是建筑与公共领域和城市的联系。这个建筑底层架空，在香港市中心的十字路口创造了一个优雅的、有遮蔽的市民空间。原来的关于这一庞然大物应给城市“某些回报”的意图，在过去的一些年中已成为一个确凿的事实。在平时工作日，这个空间是一个正式的会面地点和展示银行

At weekends it is transformed into an informal gathering place and a favourite spot for impromptu picnics. It is the multiplicity of social, commercial and urban activities, as well as the radical core plan, that constitutes its re-invention of the office high-rise.

Cities—the interplay of micro and macro scales

At the global level, the late 20th century is witnessing an exponential growth in urbanisation. In the West we are faced with the inevitable decline of the inner city, brought about by the demise of the manufacturing industries and increased social deprivation. At the macro scale, the environmental impact of cities—their effect on global energy consumption and pollution—is now firmly placed on the international political agenda. The health of our cities is seen as critical to global welfare.

Yet, at the micro scale, the design of the very spaces that bring people together—the public realm—is often ignored. As designers we have a social and political responsibility to nurture the public realm. It is this approach—mediation between the macro and the micro scales—that has informed the design strategy of a number of recent urban projects that we have undertaken in Nîmes, Duisburg, Rotterdam and London. In all these projects the process of “invention” has gravitated around the notion of the public realm.

The current World Squares project in London is representative of this approach. Together with colleagues from associated design disciplines, we are responsible for upgrading and reconfiguring a central slice of the historic city. The site includes some of the capital's most familiar urban landmarks—Trafalgar Square, Parliament Square and Whitehall. This is the London of picture postcards, the home of the Palace of Westminster, Westminster Abbey and the National Gallery. As the heart of the nation's institutions of government, monarchy and culture, the area is visited by nearly 20 million tourists a year. Yet, sadly, the urban setting of these historic monuments has become badly degraded. The streets have been ravaged by asphalt and the motor car, with a consequent erosion of the public realm that mars the everyday urban experience.

As part of our research on the project, we examined the structure of this area of the city and its relationship to greater London—an analysis of the parts and the whole. We also undertook a detailed traffic study of vehicles and pedestrians. Using the techniques developed by the Space Syntax Laboratory, we tracked pedestrian movements and analysed patterns of behaviour of tourists and local people. We looked at where people sat to eat their sandwiches and how they crossed the perilous roads to get views of the surrounding monuments. We looked for the deep structure of the city at many levels.

Only then did I feel ready to put forward a design proposal for this key area in central London, a design which clearly builds upon the rich historic fabric of buildings and public spaces, synthesising the old and the new. The urban diagram for World Squares is founded on a few simple gestures that give priority to public space. The pedestrian “body” of major spaces—Trafalgar Square, Parliament Square and Old Palace Yard—is widened and made more accessible. New gathering points are provided that take into account vistas and through movements in the area. Some key roads, but not all, are closed to through traffic. Attention is given to new surfaces and urban furniture that reclaim the public realm for the visitor and Londoner alike.

In Berlin, where we are reconstructing the Reichstag as the new seat of government for Germany, we have preserved the history of this monument by revealing memories of its past. Remnants of the

业务过程的一面玻璃橱窗。到了周末，它变成一个非正式的聚会场所以及非常受人喜爱的临时户外进餐地点。社会的、商业的和城市的多样性活动，以及具有根本意义的中心核的布局，促成高层办公建筑的再创造。

城市——微观尺度和宏观尺度的相互作用

在全球范围内，20世纪后半叶经历了城市化的呈指数的发展。在西方，由于制造工业的迁移和社会性剥夺的增加，我们正面临着城市中心不可避免的衰退。在宏观尺度上，城市对环境的影响——它们对地球能源的消耗和对环境的污染，如今已明确地列入了国际政治议程。我们的城市的健康被认为对地球的利益至关重要。

然而，在微观尺度上，能将人们吸引到一起的特定空间——公共领域的设计，常常被忽视。作为设计师，我们肩负社会的和政治的责任去发展公共领域。正是这种在宏观和微观尺度之间的调和，成为贯穿在我们最近于尼姆、杜伊斯堡、鹿特丹和伦敦等地承担的许多城市项目中的设计原则。在所有这些项目中，“创新”的过程围绕着公共领域的观念展开。

当前位于伦敦的“世界广场”的设计代表了对这个问题的探索。我们与相关的设计学科的同行一起，负责提高和改造这座历史城市的中心地段的质量。这个地段包括首都的一些人们最熟悉的城市标志，如特拉法尔加广场、议会广场和白厅。这是明信片画面上的伦敦，是威斯敏斯特宫、威斯敏斯特大教堂和国家画廊的所在地。这个地区作为国家政府部门、君主体制和文化机构的中心，每年吸引了将近2000万的旅游者前来参观。但遗憾的是，这一历史名胜的城市环境已极度恶化。柏油路面和机动车破坏了街道，结果是对公共领域的侵蚀，损坏了每天的城市感受。

作为对此项目的研究的一部分，我们分析了城市这个地区的结构以及它与伦敦城的关系，即对部分和整体的分析。我们也开展了详细的对机动车和行人的交通研究。运用由“空间结构实验室”研究的技术，我们追踪了步行者的行动，并分析了游客和当地居民的行为模式。我们观察人们坐在哪儿享用三明治，怎样穿过危险的街道去欣赏周围的名胜。我们从各个角度去寻找城市的深层结构。

直至那时，我才感到为伦敦中心的这个重要地区提出设计方案的时机成熟了，这个设计应当明确地建立在建筑和公共空间的丰富的历史结构上，结合古老与现代。世界广场的设计优先考虑了公共空间。主要空间，如特拉法尔加广场、议会广场和老宫殿庭院的步行体系被加宽，并且更容易到达。考虑到远处的景物和此地区的穿越交通，提出了新的人流汇集点。一部分主要道路禁止过境交通。新的面层材料和城市设施得到重视，为旅游者和伦敦市民重新赢得了公共领域。

在柏林，我们正在改建议会大厦，它将作为德国政府的新址。通过揭示它过去岁月的痕迹，我们保护了这一纪念性建筑的历史。19世纪砖石建筑的残迹，前苏联占领时墙上的涂写，以及

19th century masonry are exposed alongside graffiti from the Russian occupation, as well as the imprints of the 1950s. However, there is a clear distinction between these fragments of the past and the most recent intervention—our major transformation that will create a new Bundestag for the 21st century. In this, and other projects like it, the richness and variety of each period is enhanced by the layers of time. At the macro scale it is the contributions of different ages that makes a city more vibrant and richer; at the micro scale this is also true of the fabrics of those historic structures which are in search of a new lease of life.

Mindful of the wider issues of energy consumption, pollution and global warming, our design for the Reichstag also has a significant environmental dimension. The new German Parliament will be the first major public building in the world to be powered and climate-controlled entirely by renewable sources of energy. Oil from vegetable sources—rape or sunflower seed oil—will be burnt in a cogenerator to produce electricity. The process is clean, with a minimal discharge of atmospheric pollution. Waste, in the form of heat, is converted into cooling by feeding it into a heat absorption unit. Heated or chilled water is transported to thin radiators embedded in the ceilings, walls or floor surfaces to heat or cool the spaces. There are none of the traditional big ducts transporting large volumes of air—no grilles or suspended ceilings.

Further refinements in the Reichstag project include deep bore holes which can collect excess heat produced in the summer and store it in underground lakes for recovery during the following winter as a thermal energy source. Arrays of photovoltaic cells on the south-facing roof slopes also contribute electrical energy. The total system is sufficiently compact and efficient to serve the demands of the entire quarter in which the Reichstag is located; it is, in effect, a mini ecological power station.

The nature of design

Words cannot describe the appearance, feel or workings of a building—the experience of spaces, inside or outside, deserted or inhabited, involves all of our senses. When I try to explain any project with words, it becomes apparent, as I weave from the social to the technical to the aesthetic, from one concern to another, that the design is about merging or integrating the many worlds of separate disciplines.

It is not possible to separate the nature of design from the process that conceives it. If the built reality is the embodiment of diverse disciplines, then it should surely follow that the conception of the design must harness the talents of individuals with those specialist skills.

This does not mean that I am advocating a “design by committee” approach—nothing could be further from the truth. As an architect I regard it as an essential part of my mission to attempt to inspire a network of independence which transcends contractual obligations, to search for an order with shared human values. The right chemistry of human relationships is essential in this process because it entails individuals from widely differing backgrounds sharing and interacting together. Strong leadership is needed and this may pass from one group to another over the long time-span of a project. Continuity of the same set of values that inspired the project is also critical.

In many significant projects the integration of the political initiative is as essential as the philosophical component. To illustrate the relationship between the worlds of politics, philosophy and innovation I have selected two projects which do not belong to the

20世纪50年代留下的印迹，相邻着被暴露出来。但这些历史的碎片和最近的改造之间，有明显的区分。我们的这次重要改建将为21世纪创造一个新的联邦议会。在这个项目及其它类似的项目中，时间的层次加强了每一个历史时期的丰富性和多样性。从宏观上看，正是不同时代的产物，使一座城市更丰富更生气勃勃；从微观上看，对于那些正在寻求新的用途的古建筑来说，情况也是如此。

考虑到能源消耗、环境污染和地球变暖等更宏观的问题，我们的议会大厦设计还具有突出的环保特点。新的德国议会大厦将成为世界上第一座完全由可更新能源供应和进行空气调节的重要的公共建筑。植物油，如菜籽油和葵花子油，在一个发热发电设备中燃烧产生电能。这一过程是清洁的，只有最少量的气体污染物释放。燃烧后产生的废渣，以热能的形式，被填充到一个热能吸收装置中，逐步冷却。经过加热或冷却的水被输送到嵌在天花板、墙壁和地面中的薄薄的散热器中，使室内变暖或变凉快。这儿根本没有传统的运送大量冷热空气的巨大管道，也就没有了格栅和悬挂式天花板。

议会大厦的进一步的改进措施中包括深的钻孔，能够收集夏季产生的多余热量并贮存在地下湖中，以便在即将来临的冬季再次开发作为热能源。朝南的坡顶屋面上安装了成排的太阳能电池，也提供了电能。整个系统非常紧凑，有效地满足了议会大厦所在地区的全部能源需求；实际上，它是一个小型的发电站。

设计的本质

语言是无法描述一座建筑的外在形象、气氛及使用状况，因为无论建筑的内部或外部，无论废弃的或有人居住的建筑，空间的体验要运用我们全部的感觉器官。每次我试图用语言说明一项设计时，当从社会谈到技术谈到美学，从一个相关的方面谈到另一个方面，一个事实越来越清楚了，即设计就是融合和统一许多独立的学科领域的过程。

把设计的本质从构思它的过程中分离出来是不可能的。如果建成的作品体现了各种不同的原则，那么可以肯定的是，设计的构思一定结合了个人的才能与那些专门的技能。

这并不意味着我提倡“由委员会设计”的方式——事实是最好的说明。作为一名建筑师，我认为我的任务的一个基本部分是努力促成一个由独立个体组成的网络，去寻找一个具有普遍人类价值观的规律，这一网络优于合同的约束。在这个过程中，人与人之间的正确关系非常重要，因为它使背景迥异的个人一起共事、相互影响。同时需要有强有力的领导。在一个长期的工程中，这一领导权可能会从一个小组转移到另一个小组。再有，促成这一设计的同一套价值观的延续性也是至关重要的。

在许多重要的项目中，政治行为的参与与哲学的成分同样重要。为了阐明政治、哲学和创造三方面的关系，我挑选了两个项目来说明，这两个项目不属于传统的通常由建筑师参与的建筑名录，而更接近于基础设施或工程的范围。这样的项目对我们的环

traditional category of buildings normally associated with architecture, but are closer to the category of infrastructure or engineering. Such projects are often more significant in their impact on our environment than an individual building. Both of the schemes I have chosen are influenced by the political integration of Europe, which has stimulated the construction of new transportation and communication networks. Some, like roads and bridges, are highly visible; others pass invisibly via satellites in outer space, but even they need prominent earth-based towers or platforms.

In the first category is the bridge over the Tarn Valley at Millau in the Massif Central which will eventually connect France and Spain by high-speed auto routes. The project is heroic in scale and dimensions. Horizontally, it is 2.5 kilometres long and so high above the deepest part of the valley that the Eiffel Tower could easily be inserted below it with room to spare.

Not surprisingly, each of the teams which competed for this project was dominated by engineers but all were set up from the outset with an architect presence. At the time of the final jury I was persuaded by my engineer colleagues to explain the philosophy behind the concept. In the discussion period that followed, the engineers were to have full opportunity to explain the technicalities of the proposal.

Many of the teams had started from the proposition that the river, after which the valley had been named, demanded a large-span structure, perhaps a symbolic arch. I demonstrated with photos and sketches that the river was quite insignificant in the landscape: whether travelling by plane or car or on foot, you were hardly aware of it. The bridge was not about spanning the river at all. The true challenge was to span from one plateau to another, 2.5 kilometres across the valley; to create a road in the sky with the most minimal physical intervention—supports that would march across the terrain at the most economically wide span. This led us to design a cable-stayed structure that was a taut and delicate balance between the world of nature and the man-made. The logic and aesthetic of the structure followed from a philosophical stance about the very essence of the task, and it was the philosophy which separated our project from the others.

In Barcelona it was the political philosophy of a visionary mayor that was to provide the catalyst for a new form of communications structure. The city was overlooked by the mountains of Collserola, already blighted by unsightly masts and satellite dishes. In the run-up to the 1992 Olympics, plans had been announced by two television companies and the telephone monopoly to each build their own tall tower on the mountains. The response of the mayor was to say that Collserola was a protected site—a national park—and that the vistas out from the city were too important to be compromised by a forest of towers. Instead, he decreed that there would be one tower only, to be used by everyone.

Within this context we were able to design a single structure—a series of gravity-defying “tables-in-the-sky”. The tower has become a powerful symbol of Barcelona’s regeneration. Apart from its contribution to the urban skyline, the tower and its viewing platform have become a much-used facility by visitors to the Collserola park. It is a synthesis of innovation in architecture, engineering and politics, and its strength is rooted in the integration of political decision-making and the process of design.

Looking at the projects I have selected to explore the themes of invention and integration, I am conscious of the way in which the schemes relate to one another, even though they are all specific to their place and totally different in appearance. Despite the fact that design is not a linear sequence, there does seem to be a pattern.

境的影响，比起单体的建筑，意义更为重大。我选择的这两个方案，都受到欧洲政治统一的影响。欧洲的政治统一促进了新的交通和通讯网络的建设，一些是显而易见的，如道路和桥梁；另一些通过在外层空间的卫星传递，无法看见。但即使这样的网络，也离不开地面上高耸的通讯塔或通讯平台。

属于第一类的，是位于米约的跨越塔尔纳山谷的公路桥。这座桥最终将通过高速公路联系法国和西班牙。这一工程的尺度和规模堪称宏伟。它在水平方向上有 2.5km 长，距谷底最深处非常高，以至于将埃菲尔铁塔塞到它的下面还绰绰有余。

每一个参与这个项目竞标的设计小组都意料之中地由工程师挂帅，但都由一位建筑师最先展开初始的工作。在最后评审的时候，我的工程师同事说服我阐明了创作构思的基本思想。在随后的讨论期间，工程师将有充分的机会说明这个方案的技术手段。

许多设计小组都是从这条河（山谷的名称因河而来）需要一个大大跨度的结构，也许是一个具有象征性的拱这个议题开始工作的。我通过照片和草图说明了这条河在景观上极其不重要：无论是坐飞机、坐汽车、还是步行通过，你很难意识到它的存在。这座桥根本不是关于跨越这条河的问题。真正的挑战是要横跨山谷 2.5km，从一个高地飞越到另一个高地；要以最少的自然干扰，即以最经济的跨度穿越这一地形的支撑结构，来建造一条空中公路。这个想法引导我们设计了一个悬索结构，它是在自然世界和人工世界之间一个力与美的平衡。这个结构的逻辑和美学源于有关这个任务的基本本质的哲学立场。它是使我们的设计与其他小组不同的思想基础。

在巴塞罗那，是一位目光远大的市长的政治哲学促使了一座新型的通讯建筑的产生。从科塞罗拉山上可以俯看巴塞罗那市，山上难看的桅式天线和卫星接收天线已破坏了城市的景观。为了迎接 1992 年奥运会的到来，2 家电视公司和电话垄断公司已宣布计划在山上每家建一座自己的通讯塔。市长的反应是，科塞罗拉山是一处保护区（一个国家公园），从城市远望去的山的景色非常重要，不能被林立的高塔所破坏。于是，他决定只能建一座塔，大家共同使用。

在这样一个背景下，我们得以只设计了一个建筑，即一系列反引力的“空中平台”。这座塔已成为巴塞罗那市复兴的一个强有力的标志。它不仅美化了城市的天际线，而且，这座塔和它的观景平台已成为到科塞罗拉公园的旅游者利用率极高的设施。它是建筑、工程和政治上创新的综合，它的活力源于政治决策和设计过程的统一。

这些我选择用来探讨创新与统一主题的设计项目，尽管都是特定场所的产物，在外观上截然不同，但当我现在审视它们的时候，仍然意识到了这些方案彼此之间的联系。虽然事实上设计并不是一个线性的过程，但好像确实存在着一种模式。

在创造性的起点后面似乎常常伴随着一个阶段的反思和观