innovations for buildings

莱默建筑设计工程咨询（上海）有限公司
BBS INTERNATIONAL CHINA Co. Ltd.
BBS Engineers
BBS INSTITUT

Germany . China

building physics
innovations

PAVILION of INNOVATIONS
German Centre Shanghai
88 Keyuan Lu, Pudong
Shanghai 201203 China

Tel: +86 (0) 1891 7998 179
shanghai@bbs-international.com
www.bbs-international.com

创新展馆
德国中心
科苑路 88 号，浦东
201203 上海 | 中华人民共和国

电话：+86 (0) 1891 7998 179
shanghai@bbs-international.com
www.bbs-international.com

莱默建筑设计工程咨询（上海）有限公司
BBS INTERNATIONAL CHINA Co. Ltd.
BBS Engineers
BBS INSTITUT

Germany . China

Motivation	**目的**
Innovations in Energy saving of Buildings and Green Buildings	建筑节能和绿色建筑的新型技术
Innovations of Indoor Climate and the Climate Concepts	室内气候及方案的新理念
Innovations of HVAC System	建筑设备新型技术
Innovation in structure design	结构设计新理念

Priorities	**优先顺序**
Quality and Durability of the Building	建筑物质量和使用寿命
Quality Control	质量控制
Economical Optimisation	经济优化
Ecological Optimisation	生态优化

according to Chinese AND German Standards **根据中国和德国标准**

climate innovations

climate concepts	气候方案
HVAC concepts	设备方案
building physics of the building envelope	建筑围护结构的物理学研究
green buildings	绿色建筑
solar architecture	太阳能建筑
certification of building	建筑物认证
software tools for energy efficiency and certification of the building envelope	建筑围护结构能耗优化及认证软件

莱默建筑设计工程咨询（上海）有限公司
BBS INTERNATIONAL CHINA Co. Ltd.
BBS Engineers
BBS INSTITUT

Germany . China

Company for Engineering in Structural Design Building Physics Redevelopment-Techniques	结构设计 建筑物理及 改建技术 工程公司
Institute for Research and Materials Testing in Applied Building Physics and Building Materials	应用建筑物理 /建筑材料研究 与材料检测研究院

The BBS is anxious to realize the current state-of-the-art in practice and consequently to give commands to the implementation.
The BBS INSTITUT supports the BBS INGENIEURBÜRO with laboratory tests while working on projects.
The characteristics of the building materials and their dependence on the accompanying situation are checked to develop an optimal concept regarding an economical point of view.

Complementary, we give advice to the development of new structures and materials. These new structures and materials will be optimized on the basis of preliminary studies which are based on scientific and practice-orientated research; also, we attend to them until launch.
We work on publicly promoted themes of research as well as concrete kind of questions of the industry and economy.

BBS一直致力于将最新的科技运用于实践之中，并对项目的最终完成给予指导。
BBS研究院为BBS工程事务的项目处理工作提供了必要的实验支持。

我们会对建筑材料特性及其适用情况进行检查，并以此为基础，从经济角度出发拟定一个最优方案。

需要补充说明的是，我们还从事新型建筑结构与材料研发的咨询工作，以科学的、面向实践的研究为基础对结构及材料进行初步研究，并在初步研究的基础上将其优化。我们会不断致力于此，直到将产品引入市场。

我们也从事国家资助的研究项目， 比如有关工业和经济的具体课题。

innovations for buildings

partners

local partner

CG Group
中国伙伴 - 海波建筑设计事务所
local partner HPA – HAIPO ARCHITECTS

Shanghai

HAIPO Architects was founded in 1993 by Paul L. Chen AIA and Haiqing Wu AIA following their ten years of experience in the States. Initially beginning with ten people, HPA has since grown to over 100 people with offices in Shanghai and Beijing. This international team includes architects, planners, engineers and interior designers all committed to providing distinctive architecture which adds value to the local environment.

HPA consistently provides value by emphasizing design excellence in the firm's diversified portfolio including urban planning, office, commercial and residential buildings, educational, institutional and recreational facilities, and interior design. The collection of projects has brought acknowledgement to HPA through professional awards as well as publications.

With the firm's headquarters located in Shanghai, HPA has licensed architects from Germany, United States, and China. HPA has also acquired a Shanghai local design firm, Shanghai ZhongFu Architectural Design Company, which has local Grade A firm license for both architectural and engineering design practice.

HPA can provide the whole range of architectural services from schematic design to construction documentation. HPA can also act as the architect of the record.

HPA employs professionals on the fields of architecture, urban planning, interior, structure, mechanics and electrics.

Especially our M&E department has gathered vast experience on innovative energy saving design solution in the recent years. In cooperation with well acclaimed European companies the firm acted as a pioneer in implementing heat pump systems, cooled ceiling systems and more complex HVAC in its recent projects.

海波建筑设计事务所于1993年初成立于美国新泽西洲，并于1994年在上海成立了上海海波建筑设计有限公司。在过去的10年内，在中国承接了各种不同类型的工程项目，获得了业主、同行及权威机关的各种奖励和好评。公司设计的上海银辰数码大厦、上海电力调度中心大厦、上海皇都花园、上海维诗凯亚别墅区、北京万城华府、北京阳光上东二期、天津顺驰城市之光、昆明建设银行大厦等项目均获得业界和社会的好评。2003年上海虹桥21世纪城（第九城市）获得中国人居综合大奖。

海波建筑设计事务所共有八十多名各专业设计人员，其中包括多名来自于美国、德国、加拿大的注册建筑师。公司下设建筑设计部、结构设计部、设备设计部、室内设计部等四个分支，完全实现计算机绘图和电脑网络管理。公司主要合伙人陈立波先生和吴海青先生均为美国注册建筑师和美国建筑师协会会员（AIA）。

海波建筑设计事务所的服务领域包括：城市及区域规划设计，商业、住宅、旅游、教育、医院等各类建筑设计，以及室内设计。设计涵盖从概念方案到施工图设计各个过程。

海波不仅拥有强大的建筑设计，城市规划和室内设计团队，还拥有结构设计，机电设备设计团队。

特别是我们的M & E部门在最近这些年的实际设计中积累了丰富的经验，这使建筑设计过程更加合理适用。在与著一些名的欧洲公司合作过程中，海波展示了对复杂设备，如热泵系统，冷吊顶及HVAC系统的掌控和设计。

technical environment

克鲁斯国际工程事务所
kruse international engineers

Germany . Russia . China

Company for Engineering HAVC

暖通空调设备工程公司

Kruse Ingenieurgesellschaft mbH & Co. KG supervises new building projects as well as modifications and extensions of buildings both at home and abroad. Due to their expertise the supervision of the building projects can be realized in all planning phases. The focus of the planning services is on the building services and ranges from the basic evaluation to the construction supervision. The following areas are counted among the building service:

克鲁斯工程有限公司除了对新建项目进行监督，还包括国内外建筑改建和扩建项目。因其在专业知识上的能力使得项目在所有设计阶段均得到有效监督。设计服务的重点在屋宇设备，包括从基本估算到施工管理。下面列出了屋宇设备的一些方面：

- gas technology, water technology, sewage technology, extinguish fire technology
- fire protection equipment
- heat supply equipment and domestic water heating equipment
- ventilation and air conditioning
- medical engineering and laboratory techniques
- electrical engineering and building automation
- rail engineering

- 天然气技术, 水处理技术, 污水处理技术, 消防技术
- 防火设备
- 供暖设备和家用水加热设备
- 通风和空调设备
- 医学工程和实验室技术
- 电气工程和建筑自动化
- 铁路工程

So far, foreign projects have been realized and supervised in Russia, in Iran and Bolivia. In addition to the classical planning projects the company is able to advise the client in all phases of the project management and the project development. The planning is based on the newest technology and technologies of the optimized building by applying renewable energies to reduce the cost.

迄今为止，公司已在俄罗斯、伊朗和玻利维亚实施和监督了多个海外项目，除了传统的项目设计外公司还为客户提供项目管理和项目开发方面的咨询，通过应用新能源来降低建筑投资，从而达到优化建筑物的目的，并在设计服务中引用其中的新技术。

With the knowledge of the complexity of the contemporary building projects the company goes consistently for new cooperation's with architects and professional planners and realizes these cooperation's.

当代建筑错综复杂，公司以其在这方面特有的专业知识，一如既往地寻求并建立与建筑师和专业设计师的新合作。

innovations for buildings

projects

international projects

International projects

BBS INTERNATIONAL CHINA Co. Ltd.



Establishment of an innovation pavilions Lower Saxony Germany Anhui China,
within the scope of the EXPO 2010 in Shanghai - China
德国下萨克森州–中国安徽省于2010上海世博会召开之际 建造新型展厅 – 中国



LBS headquarters in Hanover – Germany
LBS中心 汉诺威 - 德国



Swimming Competition Arena Ritzhao - China
日照游泳馆 – 中国



Mexico Pavilion - Library HBK Braunschweig – Germany
墨西哥馆 – HBK 布伦瑞克图书馆 – 德国

international projects

Metro Plaza, Shanghai – China
上海浦江地铁广场 – 中国

International projects

BBS INTERNATIONAL CHINA Co. Ltd.

Metro Plaza, Shanghai - China
上海浦江地铁广场 – 中国

Hanna Tower, Villnius
维尔纳Hanna大厦

Gemini Tower, Dubai
迪拜Gemini写字楼

University, Deggendorf
德根道夫大学

High School, Brunswick - Germany
布伦瑞克高中 – 德国

Nucleic Acid Sciences, Kunshan - China　昆山科技园 – 中国

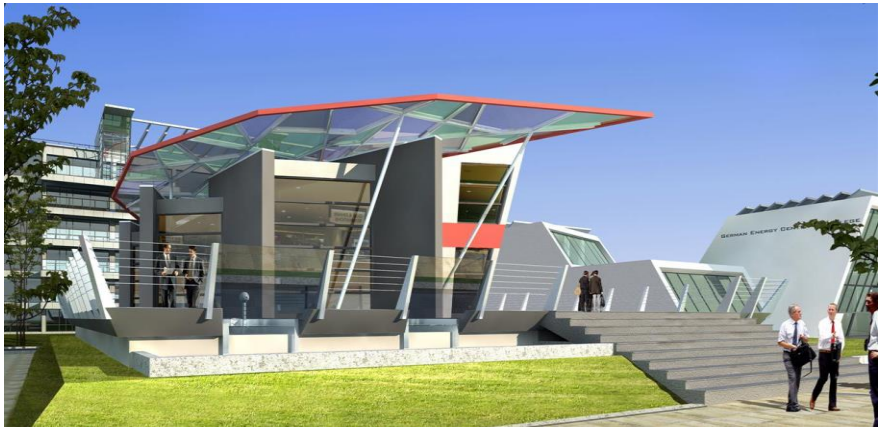
Architecture Site, Changning 长宁

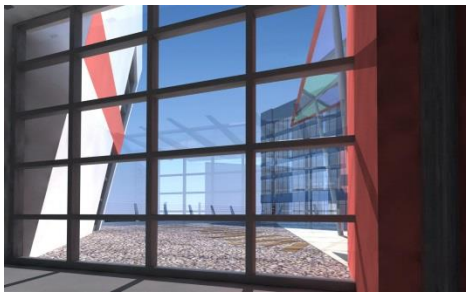
pavilion of innovations

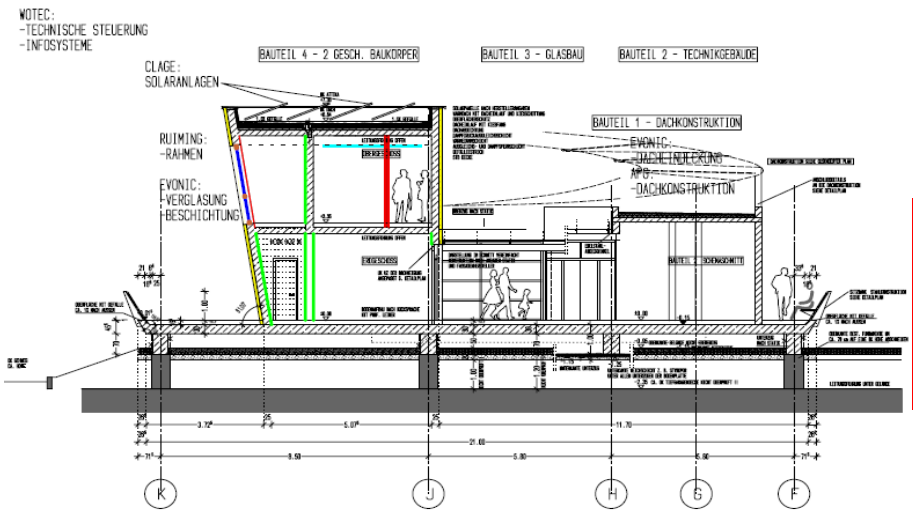
PAVILION of INNOVATIONS
German Centre Shanghai
88 Keyuan Lu, Pudong
Shanghai 201203 China
Tel: +86 (0) 21 2898 6465
Fax: +86 (0) 21 5308 1130

创新展馆
德国中心
科苑路 88 号，浦东
201203 上海 | 中华人民共和国
电话：+86 (0) 21 2898 6465
传真：+86 (0) 21 5308 1130

透视图
Outlook

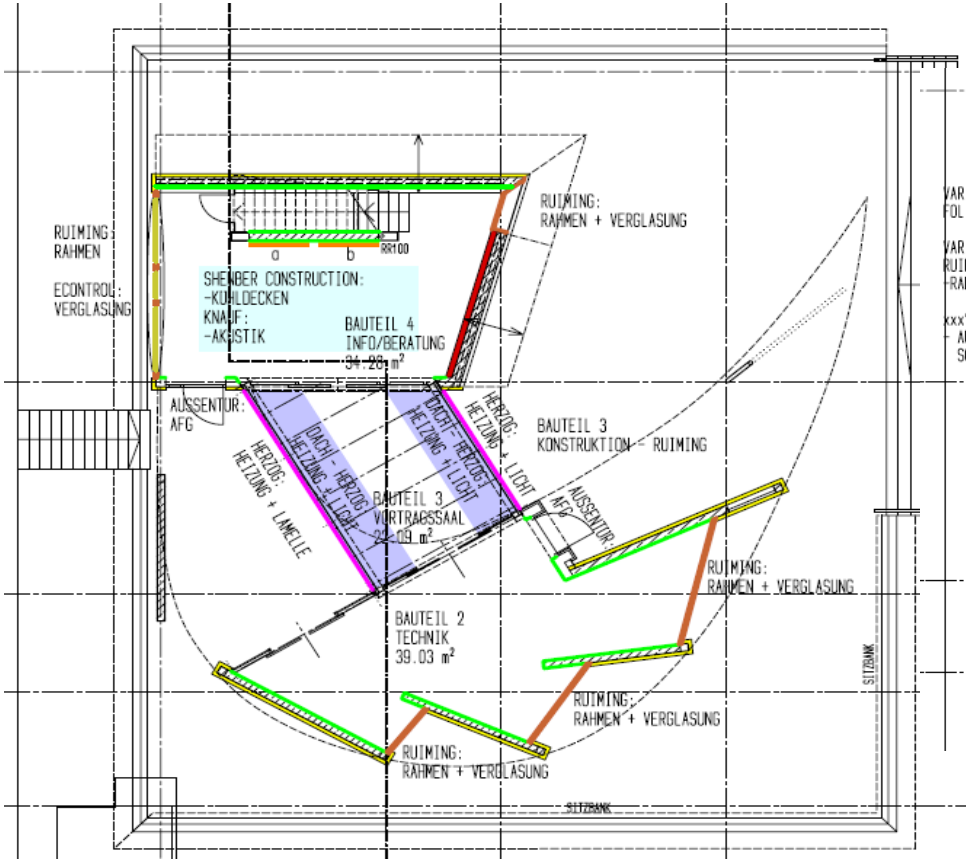


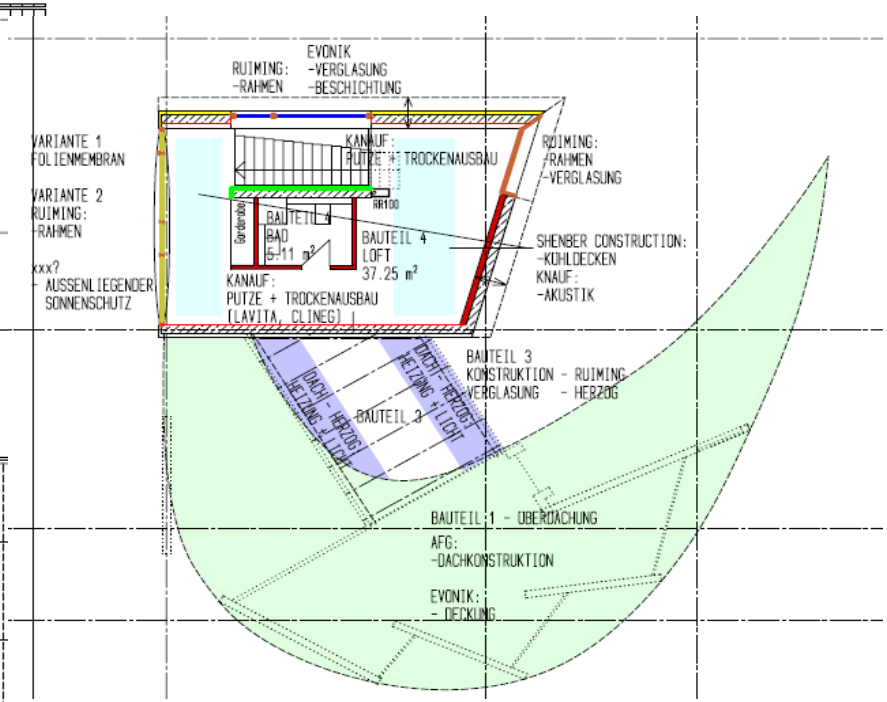




PAVILION OF INNOVATIONS

创新技术/系统
Innovations/systems





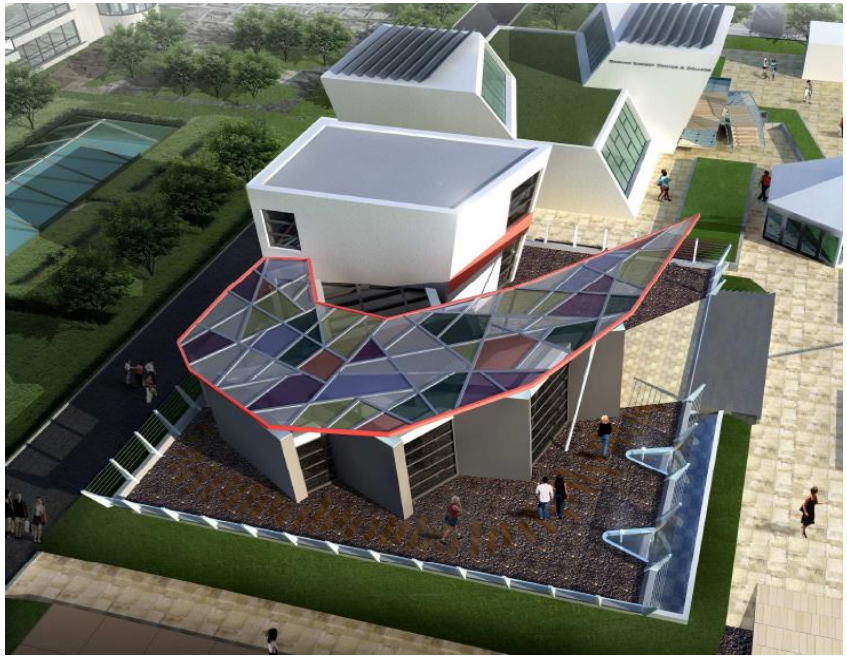
概述
General information

在几周之后2010年上海世博会即将敞开大门，喜迎四方宾客。于1851年在伦敦海德公园第一次举办的世界博览会是一次全世界范围内各个国家及各种文化聚集独一无二的盛会。

德国也在博览会中通过自己的德国馆得到了充分的展示。另外一座并非位于世博园区内而又非常别致的德国项目坐落于上海浦东新区。在这片令人眼前一亮的地块中客人将能够充分感受关于技术、结构、居住质量和环保等方面的现代科研成果。

Only a few weeks to go, and then the EXPO 2010 in Shanghai is finally opening up. The exposition, which for the first time was held in London's Hyde Park in the year 1851, is a global event, a meeting of nations and cultures like no other.

Of course, Germany will also be represented at the EXPO 2010 with its own pavilion. But there is another German project right next door to the EXPO, which is also worth visiting in any case. In the city part called Pudong, there is the Pavilion of Innovations. This area is packed with everything modern research has to offer in techniques, construction, quality of living and environmental awareness.



概述
General information

这座创新展厅同时也展示了中德两国在建筑材料和能效建筑构件研发领域间越来越紧密的合作。汉斯皮特莱默博士，德国希尔德斯海姆应用科技大学以及中国合肥学院教授，带领由很多家产品供应商和设计事务所组成的项目团队进行项目实施。
此外，建筑设计师皮特巴赫舒斯特先生、建筑工程师葛艾德博士以及设备工程师柯罗德先生在此项目设计过程中共同紧密合作。每人都在自己负责的专业范畴内为此项目从方案到设计直至实施都做出了自己的贡献。这样四人共同组成了一个中德团队，其目标为在设计最初阶段对主要工种进行整合设计，充分利用各种有效资源，从而得到一座节能建筑物。

工程现在正在紧锣密鼓的建设中，将于2010年5月1日上海世博会开幕式同时完成。

展厅工程位于作为联系中德经济的德国中心地块上。德国中心希望在其地块上通过新型技术向国内外的参观者展示“品味生活的质感”。生活质量、可持续性发展、健康、能源及未来意识的主题在时下越来越受到关注。
创新展厅也是如此。可再生洁净能源载体如空气、太阳和地热在此被推向前台。展厅将采用一中新研发的利用地热通过封闭水管系统对建筑物内部采暖的地热系统。建筑物中的废水也将利用现代科技进行清洁并再利。

Like no other comparable project, the Pavilion of Innovations stands for the close collaboration between Germany and China when developing and examinating new construction materials and energy-efficient parts. Prof. Dr. Hans-Peter Leimer, who teaches construction physics at the University of Applied Sciences and Arts in Hildesheim and at the Hefei University in Anhui, China, is head of the project team which consists of many well-known companies and construction consullting offices.
Other participants of the project are Dipl.-Ing. Peter Bachschuster, an Architect and Urban planner, Prof. Dr. Eberhard Grossert, a Civil Engineer, and Dipl.-Ing. Ronald Kruse, a HVAC Engineer. Everybody has contributed to the draft, the planning and the formation of the Pavilion in their own areas of expertise. Together, they have built the China-German-Group. Main objective of the China-German-Group is an integral planning by the magisterial planners in an early state of construction projects. The results are using the resources in a cost-effective way and also creating energy-
efficient buildings.

As the construction works move on quickly, the Pavilion of Innovations is scheduled to open on May 1st the day of the grand opening of the EXPO 2010 in Shanghai.

The Pavilion is being built on the ground of the German Centre, the first-to-go spot for business contacts between China and Germany, right in the middle of Shanghai. Within its spacious area, the German Centre wants to present a modern concept of a technologic city with the slogan „experience the quality of life“. Along with lots of Chinese and international visitors, a lot of well-known politicians and other high standing persons are also expected to visit the area, always keeping in mind that topics such as quality of living, longevity, health, energy awareness and future awareness have never been as important as they are nowadays.
That is where the Pavilion of Innovations ties in, focusing on clean, regenerative energy suppliers such as air, sun and earth. The Pavilion is heated by a newly developed system consisting of earth tubes, which pull the warmth out of the ground and transmit it to a water-filled pipe system inside the walls. By using modern technology, the wastewater from inside the building is being purified and efficiently used.

概述
General information

在创新展厅内部的高科技玻璃窗户也将对室内的舒适度有正面的影响。在这个领域有三家不同的企业希望展示最新的研发成果。加热玻璃利用内置基本不可见的金属涂层和内置百叶窗来实现，并且另有一种内置LED照明的玻璃窗，以及无颜色的遮阳玻璃。展厅中不可忽略的即为太阳能系统，一个在德国越来越普及并受欢迎的新能源。在展厅中太阳能也将用于供应生活热水。
媒体上常见的所谓“智能房屋”在此项目中也将得到体现。用户可以与房屋互动并从一个中央控制位对重要功能进行控制。在由一个中国伙伴公司研发的“房间管理系统”用户可以使用电话和触摸屏的结合设备对建筑物进行管理。
在创新展厅中本来很难从外观上进行整合的各类设备也按照设计要求成功实施。
该项目的目的就是设计一座名副其实的展厅，向来访者展示其创新并使其能够亲身体验各类新型设备。

Inside the Pavilion of Innovations, high-tech window panes will immediately create a „feel good“-atmosphere. Three different companies will present their most recent developments in this research field. A self-heating glass with an almost invisible included metallic layer and interior sun-blinds, another glass panel with built-in LED lights and last but not least, a window that can be clouded without losing any lucency will be expecting the visitors. Of course, there cannot be a Pavilion of Innovations without solar technology, which has become a more and more popular source of energy in Germany over the past couple of years. In the Pavilion, the sun energy will also be used in order to warm up the water.
The concept of the „smart house“ as seen on TV and in magazines many times, will also be presented in Shanghai. The user is supposed to interact with the building, navigating the most important functions all from one spot. Within this so called „room management system“, developed by a Chinese partner company, the central navigation is provided by a device which works like a mixture of a cell phone and a touch pad.
Energy technology, otherwise difficult to integrate creatively, has been architecturally realised in an extravagant way in the Pavilion of Innovations.
The aim was to design a building which appears lightweight, but still fulfils the concept of a Pavilion and also encourages the visitors to experience innovative energy technologies live.




PAVILION OF INNOVATIONS

LEC

建筑围护结构能耗优化及认证软件
Computer Program for Energy Efficiency and Certification of the Building Surface (Envelope)

LEC (Low Energie Certificate)
是一种建筑能耗评价设计工具。此软件在汉斯皮特·赖默教授的领导下，由BBS INSTITUT与合肥学院（中国安徽）、希尔德斯海姆应用科技大学（德国下萨克森州）、东南大学（中国南京）和Sinobau e.V.（中国上海）共同合作研发。在研发过程中也得到了来自中国德中生态商务平台（中国）和中国建筑科学院（上海分院）的合作帮助和大力支持。

利用此评价软件几乎可以对所有类型的建筑物和建筑构件根据其能耗情况，分别对其在采暖期和制冷期内进行评价。 建筑物的评价是在考虑当地气候条件的情况下，在纯建筑物理学的基础上进行的。这里的计算都是基于热工技术平衡方程的解。

评价采暖周期的基础是一些可比参照建筑物，这些建筑物是按照中国上世纪八十年代的标准建造的。制冷周期的评价则对比符合“无制冷能耗”标准定义的最优化的建筑物外墙立面。

采暖能量需求和制冷能量需求的评价是考虑了确定的数值标准权衡、总结和制定的。能耗评价的结果则用一个简单明了的星级体系来表示。这里很显然的星数越多就代表建筑物的能效标准越高，这样用户对于建筑物能耗质量评价就一目了然。

The evaluation program LEC
LEC (Low energy Certificate) is a planning tool to evaluate the energetics of buildings. The program was developed by the BBS INSTITUTE led by Prof. Dr. -Ing. Hans-Peter Leimer in cooperation with the Hefei University (Anhui/China) and the University of Applied Sciences and Arts, HAWK, (Hildesheim/Germany). The development was completed by the support of and cooperation with econet (China) and PKPM (China).

Due to the evaluation program it is possible to evaluate nearly all building types and parts of a building with regard to their energetic quality separately after the heating period and after the cooling period.
The examination of the buildings with regard to the regional climate conditions is based on pure physics. In this context it is important to mention that the calculations are exclusively based on results of heat techniques differential equations.

The basis for the evaluation of the heating period is a comparison with similar buildings (so-called reference buildings) that were in accordance with the method of building according to the standard of the 80ies paying attention to each climatic region.
As far as the cooling periods are concerned, the evaluation is based on compari-sons with an optimal front defined as neutral to cooling energy.

The evaluation of the energy for cooling and heating requirements are re-evaluated, classified and shown with regard to certain criteria. The result of the energetic verification is presented with a simple star system. An increase of stars clearly shows the energetic quality of the building, which means that the user can immediately recognize the energetic quality of the building using a simple illustration.
.

Low Energy Certificate

概述
General information

建筑设备
Technical equipment of the building

创新展厅中配备了新型的能源供给技术，主要通过可再生能源载体来实现并向德国中心的客户进行展示。
在一层技术间建筑构件中安装了保证整个展厅气候质量的全部建筑设备，将会通过DDC控制系统根据用户需求以及使用最优化进行控制和监控。
在该项目中采用了太阳能，环境空气蓄热和地热等免费能源载体。
今天的办公建筑不论是室内外大都采用大面积玻璃幕墙。该项目中投入使用了所谓的主动玻璃-内置LED照明、现代遮阳设备和采暖玻璃等新技术的窗户。
建筑物的展示通过一套面向酒店客户并且操作舒适的智能化控制系统进行实现。

Part of the equipment of the Pavilion of innovations is a novel technical device for energy supply. It mainly uses regenerative energy sources and is being visualised for the visitors of the German Centre within the Pavilion.
Within the one-storey technical building, the entire building services installations for air conditioning is located and presented. Using the DDC (Direct Digital Control) device, the installations are regulated, controlled and monitored in a usage-optimized and userfriendly way.
Free-of-charge energy sources such as sunlight, air warmth and earth warmth are being used in this project.
Another part of the technical equipment of the building is the guarantee of a effective and optimized watering and dewatering systems. Therefore, the possibility of rainwater use and wastewater use is being taken at the Pavilion. Nowadays, the interior and exterior surface of office buildings is mainly made out of glass components. Therefore, the project will introduce “active windows” using built-in LED lights, modern clouding devices and heating glass.
The presentation is being topped off by an intelligent high-comfort building management system, which should be especially interesting for hotel guests.

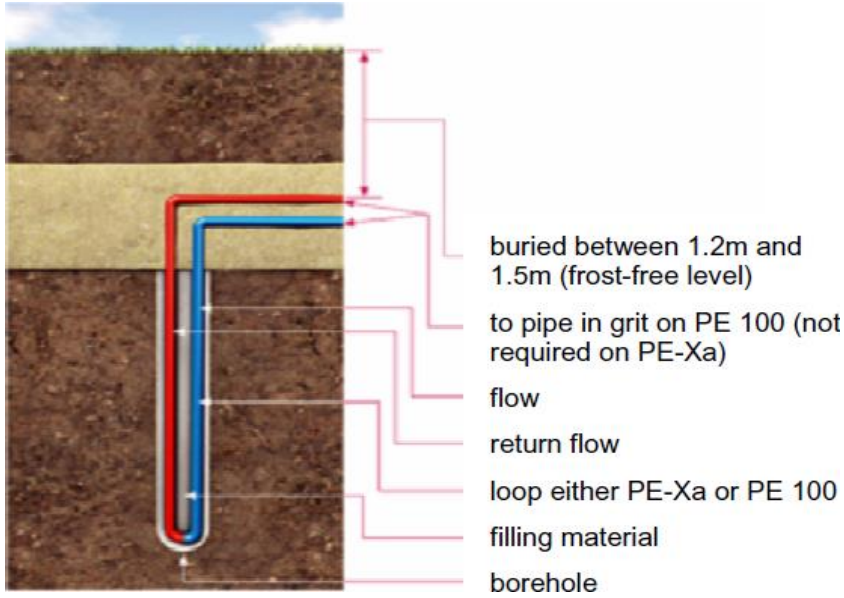
地热采暖和制冷
Geothermic energy for cooling and heating

建筑设备
Technical equipment of the building

采用地下热源进行采暖和制冷属于建筑设备中的新兴技术。将地热用于墙体采暖和室内制冷需要应用一台热泵机组。
本项目中也应用了自主研发的地埋探头，此类探头在地下部分不需任何焊缝，并配备相应的传感器，探头内部可不断进行循环传热。

Cooling and heating of buildings using geothermic energy is a pretty recent technology that is being introduced at the Pavilion. The technology uses a heat pump in order to either warm up the walls of cool down the rooms.
Sensors-featured earth-sensors which don't need any additional welding once put into the ground will be used. The heat carriers circulate within these earthsensors.

Probe foot of the earth probe



地源热泵
Brine-water heat pump

建筑设备
Technical equipment of the building

建筑物室内环境需要一套适用用户要求的通风系统。新风的调节功能由热泵机组处理。这里会适用室外空气热能。
新风通过特殊地热交换设备进行处理。降温后的空气将导向室外。建筑物处理后的新风分配由一套通风系统实现。
上海属于亚热带海洋性季风气候，特别适合地源热泵的使用，年工作效率能达到3以上。

The full air conditioning of the building requires an air conditioning system which can be adjusted to the actual user's needs. The air conditioning of supply air is being provided by warmth pump which uses the energy of the outside air. Special earth heat exchangers draw in the air.
After being cooled down, the air is ejected back outside. The inside distribution of the air through the building is provided by a ventilation system.
Shanghai with it's subtropical maritime monsoonclimate is especially suitable as place of construction for the air brine-water heat pumps, providing annual labor numbers of at least 3.

Warm pump with work-sided built-in passive chill module

Buffer memory

cooling

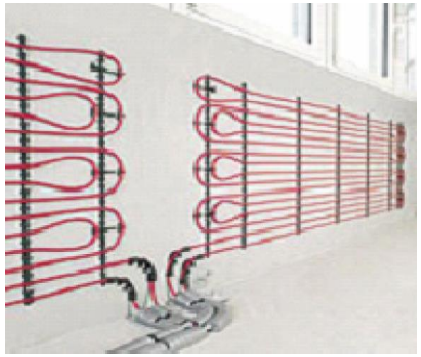
heating

采暖– 制冷
Heating and cooling

建筑设备
Technical equipment of the building

通过新型系统获得的能源将用于建筑物的采暖和制冷。
大面积地面、墙面采暖以及冷辐射吊顶将用于该项目中。除了在德国市场上很常见的如地面采暖和冷辐射吊顶之外，新型的墙体温控系统也将在上海投入使用，同时对其从建筑物理角度进行测试。

The energy won by the innovative devices is being used for both heating and cooling of the buildings components.
Surface systems of the floors, ceilings and walls will be used. Among with systems which are already common on the German market, such as floor tempering and ceiling tempering, new developments such as wall tempering will be used. They still need to be tested from construction physics point of view under the climate circumstances of Shanghai.



遮阳、艺术和采暖玻璃系统
Glass systems for clouding, illumination and heating

建筑设备
Technical equipment of the building

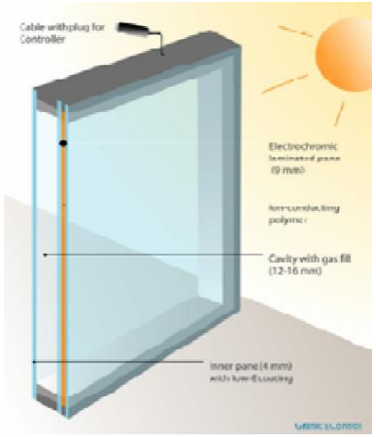
为了使大面积温控系统更加有效的运行，该项目中还投入了遮阳以及采暖玻璃产品。
遮阳玻璃系统是在多层玻璃的层间加装内置遮阳设备，采暖玻璃系统是在玻璃上多一道纳米结构涂层工序并由此降低玻璃的阳光投射率。用户可以选择五个分级的透光率。
内置遮阳的具备使用寿命长，以及低维护免清洁的特点。
这种遮阳措施非常适合风载很大、卫生要求高的建筑物，对于不适合采用内遮阳以及外遮阳的建筑物也非常实用。
玻璃幕墙通常由于冷辐射会对室内气候造成负面影响。项目中会展示一种无电加热丝的采暖玻璃。这种采暖玻璃会在空气层内面加一道导电金属涂层来实现加热。这种采暖玻璃可以与内置遮阳设备结合使用。
“高科技时代”的另一个成果是一种内置LED照明的玻璃。用户可以将玻璃设置成所需要的颜色，并且可以通过编程进行灯光色彩变化设置。

In order to use the surface systems as effectively as possible, glass systems will also be included into the Pavilion.
These systems either provide a built-in sun blind or nano-particles color the glass and reduces the transmission of sunlight within the composite glass plate. The user can choose between five steps of light filtering.
Along with it‘s longevity, this integrated sun protection is expected not to cause any major operating or cleaning expenses.
This kind of clouding device is especially suitable for buildings which are exposed to strong wind or have to fulfil high hygienic standards, not offering an installation of both interior and exterior clouding device.
Glass walls often affect the room comfort in a negative way due to their cold radiance. Within the scope of the exhibition, a self-heating glass without wires will be presented. The flow of heat within this glass is provided by a thin metal layer placed between two glass layers. This glass can also be combined with a clouding system.
Another result of the „High-Tech-Generation“ is a glass with included LED lights. The user can choose the illumination or the play of color using a special program.

Heating

Ilumination

Clouding

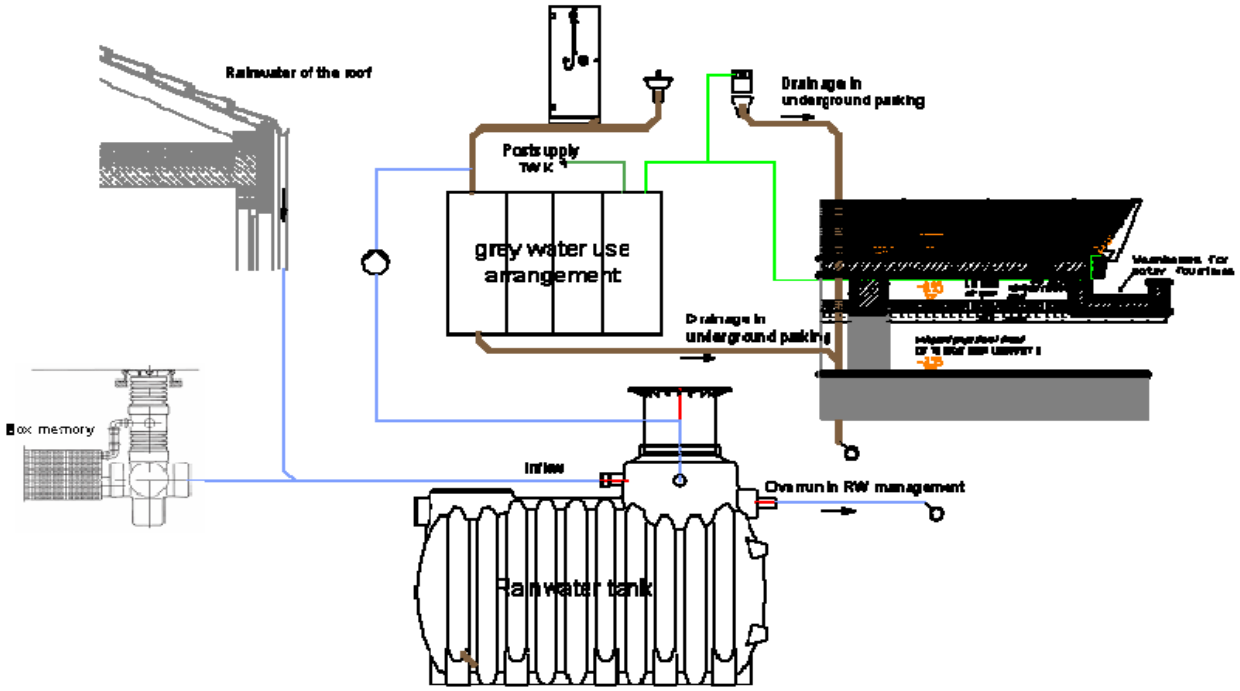


用水管理
Water management

建筑设备
Technical equipment of the building

雨水和废水的回收再利用技术由于其环保性越来越受到关注，特别是在一些人口众多的国家和地区。
供应、使用和再利用的关系在该项目中将会充分展示。用水管理系统（如雨水再利用、净水系统）的各类设备安装在展厅内以及室外地下。

Rain water and waste water technologies are gaining more and more ecological impact, especially in countries with high population rates.
This interaction of gaining, using and reusing is presented by using different technological devices. The water management systems such as rain water use and water processing are shown both inside and outside the Pavilion by using different technical systems.



智能建筑控制系统
Intelligent building control

建筑设备
Technical equipment of the building

整个展厅的技术设备通过一个人性化的上级控制系统进行监视和控制。
所有的信息会通过网络传输至德国的研究所，以便对系统的状态进行实时评估。
每个设备的控制系统会按照室内气候要求进行全面优化。
用户可根据需要，由总控室通过“房间管理系统”对所有系统进行设置和调控。

The entire technical devices of the Pavilion are monitored and adjusted by a user-friendly superior system.
In doing so the adjustment systems of the particular devices will be optimized and matched to the climate requirements.
By using a “room management system”, the user is given the possibility to navigate the most important functions and adjust settings all from one spot.

climate concepts

LBS headquarters in Hannover– Germany

LBS中心 汉诺威 - 德国

工程师	BBS INTERNATIONAL
设计师	PSP Braunschweig – Germany
客户	LBS headquarters in Hanover – Germany

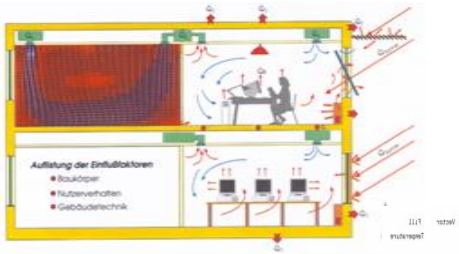
More and more often office buildings are in demand that guarantee defined climate conditions. However, unlike ordinary office buildings they are based on technologically different concepts. Apart from being representative these buildings face the challenge to reduce the complete energy needs and the CO2-emission in comparison with buildings that are completely air-conditioned. Furthermore it is intended to offer to the user a feeling of a natural ventilation and to feel very comfortable in these rooms.

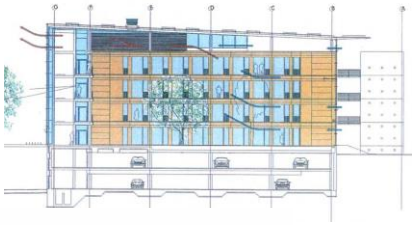
The reconstruction of the LBS in Hanover, Germany, includes a four-storey administration unit built as cubes that are separated in their rows by conservatories. These cubes share an atrium, around which you can find the open offices. The completely used areas as well as the atria and the conservatories are covered by a steel-glass-construction. The temperature reactions in the court-yards, the atria and the offices, the streaming simulation calculations in the court-yards, the daylight simulation calculations of the offices, the humidity reaction of the building parts with regard to the combined warmth- and damp transportation, the sound-proofing of the offices, the room acoustics of the halls and of the court-yards were determined with the help of an integral building planning.

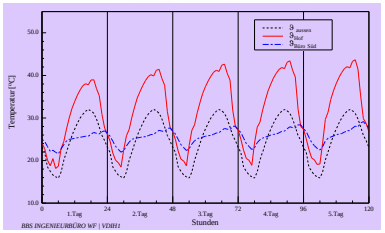
办公室建筑越来越多的要求保证所定义的气候条件，但是与一般办公室建筑相比却是建立在完全不同种类技术的基础上。除了一些具有代表性的功能之外，这种建筑物与空调建筑物相比可以使总能耗和CO_2排放量降低，并使用户感受到自然通风和提高室内舒适度。

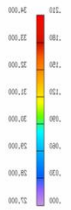
位于德国汉诺威的LBS新建建筑包括了四座由中庭花园分开的四层的方形建筑主体。这些方形建筑主体形成一个中庭。整个使用区域、占地区域包括中庭和花园都由钢-玻璃-结构围护。

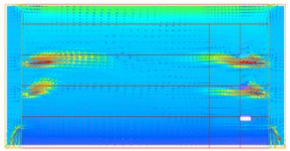
通过深入的建筑设计可以确定大厅、中庭和办公区域的温度情况、大厅空气流动模拟计算、办公室自然光模拟计算、湿热综合考虑下的建筑构件的湿度情况、办公区域噪声防护、大厅室内声学。











climate concepts

Mexico Pavilion - Bibliotheca HBK Braunschweig – Germany

墨西哥馆 – HBK 布伦瑞克图书馆 – 德国

工程师	BBS INTERNATIONAL
设计师	KSP Germany – Beijing
客户	State construction management + Nileg - Germany

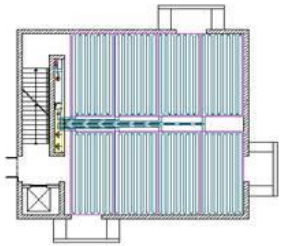
After having used the cube of Mexico designed by the Mexican architect Ricardo Legoretto as an exhibition pavilion, it was supposed to serve as the library of the HBK Braunschweig. Because of these requirements the town Braunschweig decided to use this pavilion for the planned extension of the art library in Braunschweig. As it was temporarily used in summer during the Expo, it became necessary to make extensive structural physical verifications of the room climate and of the sound-proofing of the building shell.

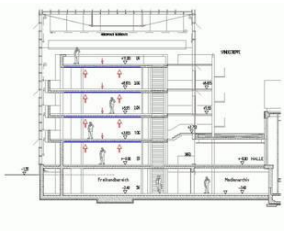
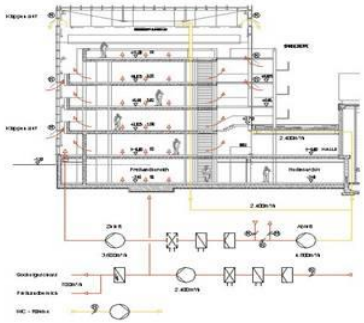
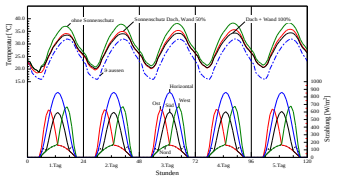
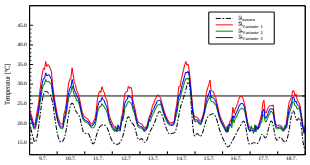
在作为展厅使用完毕后，这座由墨西哥建筑设计师Ricardo Legoretto设计的墨西哥馆作为HBK 布伦瑞克的图书馆使用。

所以布伦瑞克市决定将展厅移往布伦瑞克作为艺术图书馆的拓展。
由于夏季世博会期间的临时使用，整个展厅事先要求对围护结构做了关于室内气候和噪声防护的大量建筑物理测试





building physics

Annexe of the Herzogin Anna Amalia library in Weimar – Germany

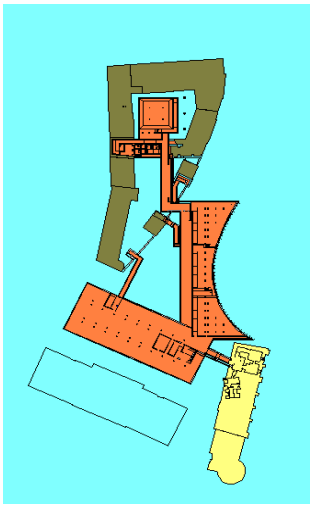
魏玛 Herzogin Anna Amalia 图书馆扩建建筑 – 德国

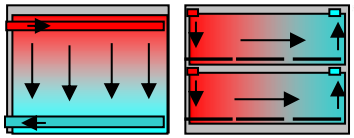
工程师	BBS INTERNATIONAL
设计师	Prof. Karl-Heinz Schmitz, Prof. Hilde Barz-Malfatti – Germany
客户	classic trust Weimar - Germany

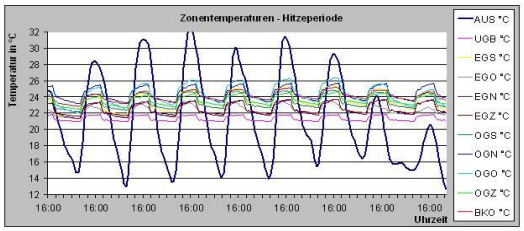
Of all the books of the Herzogin Anna Amalia Library (approx. 900.000 volumes) only a small part (approx. 100.000) could be stored in the building of this historic library. The main part had to be stored in different storerooms in and around Weimar.
In order to keep the main building as the centre of the library, an extension had to be built as close as possible to the historic library.
When the town council was centralized, the trust "Weimarer Klassik und Kunstsammlung" was given the possibility to acquire the historic buildings next door and the right to build in the subsoil for the space between these buildings

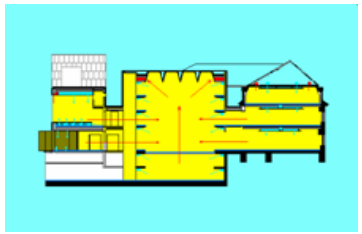
Herzogin Anna Amalia 图书馆的藏书（约900.000册）只有小部分能存放在这座历史性博物馆建筑物内，另外的大部分（约100.000册）则存放于魏玛及周边地区的储藏室里。

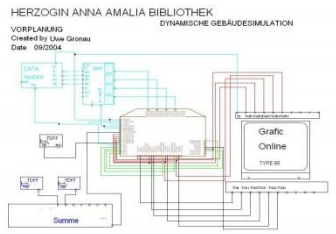
为了使图书馆的中心主建筑能够长久的保存，必须在其周边建造一座扩展建筑物。随着城市管理的集中化，魏玛古典和艺术收藏基金会有了机会申请到相邻的历史性建筑群和建筑区地下部分的建造权。











competition

Swimming Competition Arena Ritzhao – China

日照游泳馆 – 中国

工程师	BBS INTERNATIONAL
设计师	Bachschuster ARCHITECTS
客户	Shandong planning institute

Five internationally active architecture offices were invited to this competition. The Bachschuster Architecture Office was the only architecture office from Germany.
A swimming competition arena had to be planned and developed to international standards. The integration of different areas which are open to the public (wellness, fitness, outside swimming areas etc.) and the integration of nature had to be included alongside this.
Our design shows an area of approx. 26.000m², which is divided into three areas: the entrance with the impressive aqua dome, the main building and the nature trail in the nearby water area. You can reach the aqua dome via a futuristic footbridges, which is both a restaurant and a lookout. It is supposed to become the new symbol of the swimming competition arena Ritzhao, that is also visible by night as a significant construction from a far distance because of its special illumination. The diving pool is built within three storeys and completely made of glass and the VIP area floating freely under the dome are an extraordinary highlight of this indoor pool. An illuminated waterfall separates the generous and open competition area from the leisure area, whose outdoor pool creates a fluid transition to nature.

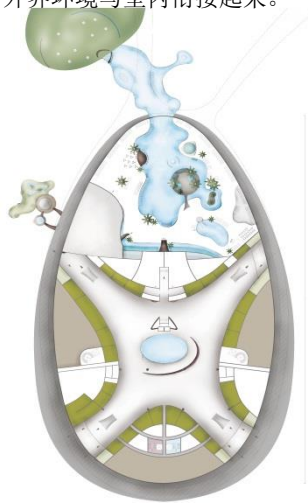
共有五家国际性建筑设计事务所受邀加入此次竞赛中来。 Bachschuster ARCHITECTS是唯一一家来自德国的建筑设计事务所。

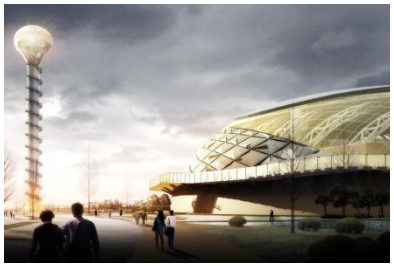
这座游泳竞技馆必须按照国际标准设计。各公共开放区域间的结合（健康中心、健身中心、室外游泳区等）以及与自然间的结合必须同时考虑。

我们的设计展示了约26,000m²的面积，分为3个区域：建有一座宏伟“水球塔”的入口区域、主建筑物和与水景相连的小径。

通过未来风格的水阶可以到达“水球”的位置，这里是一个餐厅并且也是观景平台。这座“水球塔”也是这座游泳竞技馆的标志，在晚上打上特殊的灯光后在很远处就可以清晰的辨识。

最吸引人目光的莫过于那全玻璃的三层楼高跳水池以及穹形屋顶下悬浮着的VIP层，一层发光的水帘将敞亮的比赛区从活动区中分割开来，位于活动区中的室外游泳池自然地将外界环境与室内衔接起来。





competition

Swimming Competition Arena Ritzhao – China

日照游泳馆 – 中国

工程师	BBS INTERNATIONAL
设计师	Bachschuster ARCHITECTS
客户	Shandong planning institute

From the aqua dome you reach a swung footbridge that surrounds the building and creates a connection of these three areas. The footbridges symbolize dynamics and energy. They stand for the whole and the connection between water, human beings and nature. They begin at the starting point human being in space, lead via the element water to the indoor pool and finally to the nature area in the lotus bloom pavilions, which are starting points for the nature trail. The building is symbolically integrated into nature.

The special part of this design can be found in an artificial lake around the arena, which was designed as a so-called nature trail. This means that experiencing the building from the outside is not only possible for the competition spectators.

The lotus blooms serve as information centres and viewpoints and integrate the nearby natural landscape. The transition from human being and water to nature takes place here. Both pavilions are connected by an underwater tunnel completely made of glass. So the circle of the nature trail closes and the energy flow is not interrupted.

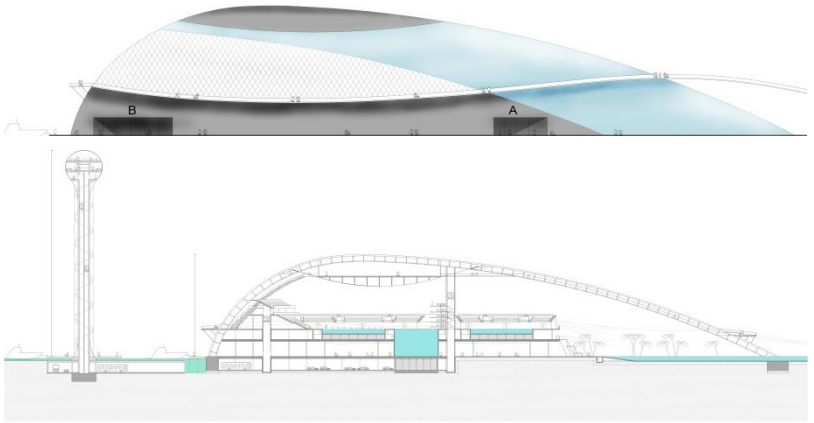
Furthermore the tunnel offers a fascinating insight into the underwater world of the natural landscape. The educational trail is supposed to bring nature closer to the visitor and to give an insight into the world of animals and plants at every single stop.

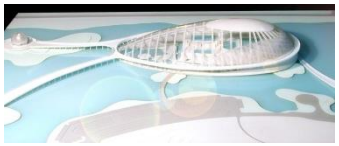
从塔上眺望，人们可以看到悬浮的跳板围绕整个建筑物并连接三个区域。

跳板象征着动力和能量，代表着水、人和自然之间的统一和联系。它们以场上的人为起始点，穿越游泳池中水的上方，最终结束于自然区域中的莲花展厅，同时又是自然景观路线的起始点，整个建筑物像是被在自然界中固定住一般。

本设计特殊之处在于围绕整个场地的人工湖，整个区域同时被设计成为自然景观路线，这就意味着，公众无法从外部参观该建筑物，只有参观比赛的观众可以。

莲花形展馆在这里用作信息中心和眺望台，并连接自然景观区域，同时人和水交汇于自然界的地方。这两个展馆通过一个全玻璃的水下通道相连接，如此一来，既保证了整个自然景观区域的完整性，也不至于破坏能量流动。此外，观众通过水下通道可以欣赏到绚丽的水下自然世界，循着天然小径，还会更进一步接近大自然，让观众有机会亲密接触动物和植物的世界。





local partner

SHANGHAI SILVER CITY CYBER TOWER

上海银城数码大厦

CG Group
中国伙伴 - 海波建筑设计事务所
local partner HPA – HAIPO ARCHITECTS

Shanghai

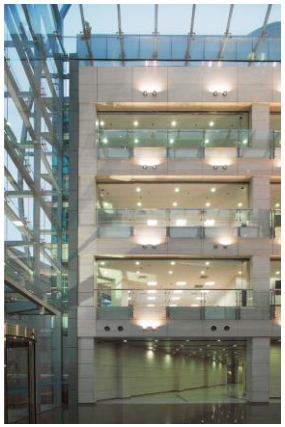
Shanghai Cyber Tower is located in the Downtown Huangpu District, on a bustling commercial avenue. The building consists of a 35 storey high tech office building, with a five storey base for business use. The main volume is a square shape, with a dynamically curved curtain wall wrapping the upper part of the building. The combination of the modern dynamic cladding, and the high tech design have made Cyber Tower a landmark on the Shanghai skyline.

上海银城数码大厦位于黄浦区繁华 的西藏南路商业地段。本项目是由一幢35层的高科技数码大厦与五 层商业裙房组成。主楼形体采用对称的方形，全玻璃幕墙的主楼顶部 形成波形幕墙。向上飘逸的形体，体形了高科技智能建筑的特殊风格。成为本地区的标志性建筑。

Address: 75 Guangdong Rd., Shanghai
Gross Area: 64,680m2
Design/Completion: 1999/2002
Associate Architect: LAD

地址: 上海广东路75号
面积: 64,680m2
设计/竣工: 1999/2002
概念合作设计: 美国LAD




local partner

SHANGHAI MAXDO CENTRE

上海万都中心

CG Group
中国伙伴 - 海波建筑设计事务所
local partner HPA – HAIPO ARCHITECTS

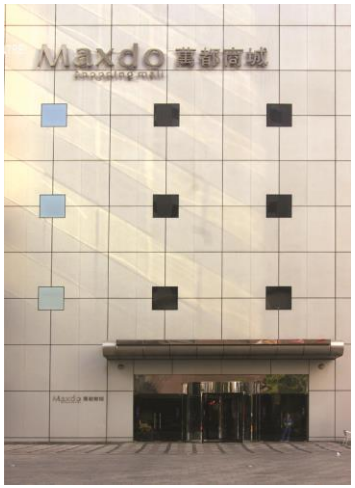
Shanghai

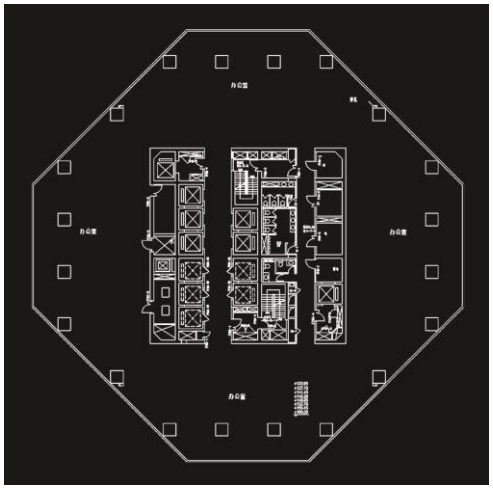
The Maxdo Tower consists of 55 floors of leasable office space and a four-storey base building. The tower reaches to 212 meters in height and has over 120,000sm of building area. At the base of the tower it is shaped as a square in plan, by the time it reaches its apex it has transformed to a hexagon in plan. The building responds to the Zunyi Road axis, and is placed at an angle. The building's silhouette can be seen while passing by on the Yan'an Highway, and acts as a visual marker on Shanghai's skyline for the district.

万都中心由一幢55层商业主楼和4层商业群房组成，高212米，总建筑面积120，000m^2。主楼以方 形为主体，上部转换成六角形。与遵义路轴线相呼应，并形成延安路干道上良好的视角关系。

Address: Shanghai Hongqiao Development Zone
Gross Area: 120,000m2
Design/Completion: 1995/2001
Structure, M&E: ECADI

地址: 上海虹桥开发区
面积: 120，000m2
设计/竣工: 1995/2001
结构及设备设计: 华东建筑设计 研究有限公





local partner

NO.2 DEPARTMENT STORE NOVEL BUILDING, SHANGHAI

上海二百永新大厦

CG Group
中国伙伴 - 海波建筑设计事务所
local partner HPA – HAIPO ARCHITECTS

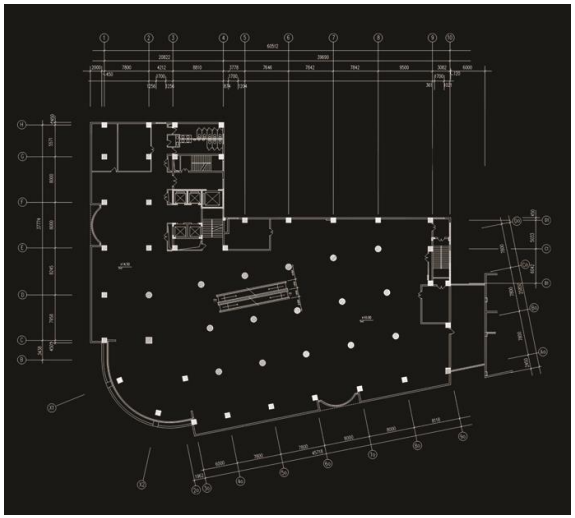
Shanghai

This project is located on the Huaihai-Maoming Road in the center of Shanghai. The building maintains harmony with the surrounding multi-directional environment through a carefully planned change in the building's height and the special care given to the facade details. The defining formal symbol of the building is a curved corner topped by an elegant brow. This symbol works in conjunction with the two-storey high entrance hall set back from the road offering a buffer zone for crowds. The project won the 1996 "Baiyulan Award" of Shanghai City.

项目位于上海中心商业区的淮海路 茂名路。建筑以富有层次变化的造型及精心设计的细部处理，与多 向性的周围环境协调共生。顶部标志性圆弧檐顶与转角相呼应,并退 后形成一2层楼高的入口广场，为人流提供缓冲区域。本工程获上海市一九九六年度“白玉兰奖“。

Address: Huaihai Road (Central), Shanghai
Gross Area: 31,000m2
Design/Completion: 1993/1996
Structure, M&E: ECADI

地址: 上海市淮海中路
面积: 31，000m2
设计/竣工: 1993/1996
结构及设备设计: 华东建筑设计研究 有限公司



local partner

SHANGHAI ROYAL GARDEN

上海皇都国际花园

CG Group
中国伙伴 - 海波建筑设计事务所
local partner HPA – HAIPO ARCHITECTS

Shanghai

This project is located in the town of Qibao in the Minhang District. The combination of building types within the community include high-rise, mid-rise , multi-layer buildings and joint-villas. In the general planning, based on the "human being centered" design principles, a large-scale garden is placed at the project's center to be the traffic hinge where the two main axes of the community cross. The buildings are arranged around the central garden and increase in height from the center outwards.

该案位于闵行区七宝镇地区，基地东面正对大型水上游乐场“热带风暴”。小区内住宅以高层、小高层、多层及联体别墅为主，绿化率在50%以上。总体规划本着“以人为 本”的设计思想，在基地中心位置规划了一个大型中心花园，以其为 交通枢纽进入小区的两条主要轴线，周围建筑围绕中心花园由低到 高渐次展开。

Address: Gudai Road, Shanghai
Gross Area: 430,100m2
Design/Completion: 1998/2002

地址: 上海顾戴路
面积: 430,100m2
设计/竣工: 1998/2002

HVAC Innovations

New embassy in Bolivia, La Paz

德国大使馆 拉巴斯 玻利维亚

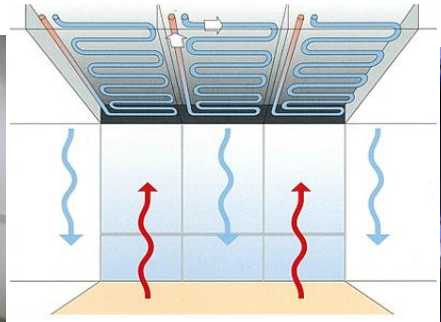
工程师	kruse international engineers
设计师	bow Braunschweig
客户	Bundesrepublik Deutschland

The new office building will realized on a federally owned residence premises in a height of about 3.300 meters.
The building is orthogonal in northeast and northwest side. Its lateral length is round about 29 * 8 meters. In the southeast side the building is going to have a curved facade. The maximum extension is around 32 meters, the maximum width about 10 meters. The 4 storey construction (basement, ground floor, 2 upper floors) has a height of 13.30 meters. Due to the surroundings the building extends to different depths in the ground.
The massive construction building has supporting walls with reinforced concrete components and has not supporting walls with dry construction.
The office has planed the service types (heating, sanitary, electro and ventilation) according to the newest technologies and has aligned it to the climatic conditions. Right from the planning stage the seismic load of the units has been applied to the technical equipment.
Over a central building automation the regulation and monitoring occurred.

这座使馆新楼将建在联邦政府海拔高达 3,300 m 的地块上。

这座建筑的东北边和西北边各为一个边长约为 29 x 8 m直角形状。东南方向有面在平面图上看是弧形的幕墙。最长扩展长度约为 32 m，最小宽度约为 10 m。整个建筑由4层组成（地下一层，地面层，三四层），共13.30 m。由于地形情建筑物在地块上的深度也不尽相同。

此建筑为实体建筑，承重墙采用钢筋混凝土构件，非承重墙采用干墙构件。
设计方对于采暖、给排水、电气和通风这些方面都按照最新的技术标准和当的气候条件进行设计。设备技术设计中最特别的就是建筑构件达到的抗震要求。
各个系统组件的控制和监视通过整个建筑物的自动化实现。



electric environmental

depot Metallostroj Saint Petersburg – Russia

圣彼得堡Metallostroj火车站 – 俄罗斯

工程师	kruse international engineers
设计师	Siemens AG
客户	Russische Staatsbahn

The maintenance hall „Metallostroj„ was totally reconstructed and renovated in Saint Petersburg for the russian state railrode.
The high-speed trains „Velearo Rus„ will be totally maintained and overhauled at this place in the coming years. Besides the constructional retrofitting of the hall complex a total redevelopment of the technical equipment was necessary. This covered the areas of wastewater, water, heat, ventilation and electrical engineering. A characteristic, which results from the drive engineering of the trains, were the different voltage levels that had to be supplied in the hall complexes. The voltage levels are 25 kV ~ ; 3 kW = and 400 ~V.
Due to the different voltage a complete new earthing concept has been developed, that completely allows for the aforementioned facts. Furthermore, a great focal point of this project laid in the renewal of the safety engineering as a complex monitoring system. In addition to the implementation and the application of the newest German technologies the compliance with the Russian standards and regulations had to be integrated. By the use of a constant on-site construction management the installation of the components could take place under high quality standards.

为俄罗斯国家铁路位于圣彼得堡的维护中心„Metallostroj“进行了彻底的改建和维修。

在未来几年这里将要对高速列车„Velearo Rus“进行维护和修理。除结构加固外，对建筑物的设备也需要进行彻底的维护。这里包括了给排水系统、采暖、通风和电气系统。

这里有一个由列车动力技术而产生的特别之处，在整个建筑内必须要设置不同电压。包括25 kV ~ ; 3 kW 和 400 V ~ 。

由于不同的电压，需要一整个能符合上面所指情况的新接地方案设计。另外项目的一个重点是在安全技术上的翻新，整套的监视系统。引入并采用了最先进的德国技术的同时必须保证满足俄罗斯的标准和法规。

通过持续的现场施工管理可以保证各个部分的施工质量。

environmental

New Raja Depot Teheran – Iran

德黑兰新火车站 – 伊朗

工程师	kruse international engineers
设计师	Consortium IOEC/Neuero
客户	Raja,Passenger Train Co.
	Consortium IOEC/Neuero

The new RAJA Depot Tehran will be an industrial complex for maintenance, overhaul and repair of DMU Train Sets as well as different kinds of Passenger Coaches and Double Decker Coaches. Further the necessary service like interior cleaning, catering, utilisation of toilets and refuelling of drinking water will be executed in the area of the New RAJA Depot. Further the property line of the depot area has been subject to change. As a result the area available for the execution of the depot project has been reduced. Due to the new shape and size of the area and the general track layout the new planning had to redesign the entire layout of the buildings and facilities and to modify the size, shape and position of the buildings.

The RND incorporates the following workshops and facilities:

- Light Maintenance Hall for DMU (LD)
- Light Maintenance Hall for Passenger Coaches (LP)
- Heavy Maintenance Hall for DMU and Double Decker Passenger Coaches (HH)
- Underflow wheel lathe (UWL)
- Service Hall for interior Cleaning and Catering
- Fuelling Station and (FUEL) Sand Feeding Plant
- Washing Plant

The planning of the halls mentioned above were realized by Iranian offices and were checked in our enterprises with regard to German standards. The development of the buildings and the integration of the planning of the halls are completely carried out by our company. This includes the following services:

- sewage
- industrial sewage
- potable water
- industrial water
- rain drainage
- fire fighting devices
- electronics
- gas

德黑兰新火车站将是一座用于对DMU列车组以及其他种类的客运列车和双层列车进行维护、监察和修理的工业建筑物。其他必要的服务如车内清洁、食物供给、卫生间维护和饮用水补充都将在车站内完成。

另外车站区的地界线不得不改变。结果用来完成车站工程的地块面积减少了。由于整个地区和轨道总布置形状和大小的改变，必须重新对建筑物和设备的整体布置重新设计并对其大小、形状和位置进行修改。

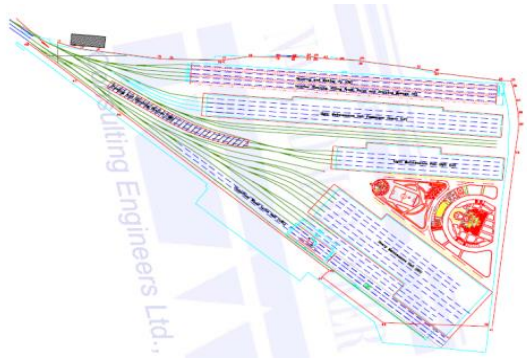
RND 包括以下建筑物和设备：

- 轻型维护大厅 DMU (LD)
- 轻型维护大厅 客运列车 (LP)
- 重型维护大厅 DMU 和 双层客运列车 (HH)
- 底流车轮车床 (UWL)
- 车内清洁和食物供给服务厅
- 燃料供应站 和 Sand Feeding Plant
- 清洗车间

以上设计工作由伊朗设计单位完成并由我方根据德国标准进行审核。
我方完成了建筑开发和大厅设计的融合。

包括了以下内容：

- 污水
- 工业废水
- 饮用水
- 工业用水
- 雨水
- 消防设备
- 电气
- 供气



HVAC Innovations

New building nursing station; otorhinolaryngologist/ ophthalmic clinic university hospita in Bonn-Venusberg – German

波恩-维纳斯堡大学综合诊所耳鼻喉/眼科新住院部 – 德国

工程师	kruse international engineers
设计师	Schneider und Sendelbach Architekten
客户	Universitätsklinikum Bonn

In the course of restructuring the building complex in the university hospital of Bonn extensive new buildings has been realized on this area.
A big phase of construction is the new constituted disinfection section with 50 beds. The disinfection section has a 14 mill euro total investment, the biggest in Germany.
The staffs and the inpatients have an attractive building with bountiful floor plan. Every inpatient room has its own plumbing unit.
The building services have particularly high requirements in safety engineering, the fire protection requirements and the sound insulation.
To facilitate an ideal climate a concrete core cooling system has been implemented in order to impair the heating up of the building installed. Of particular value is the equipment regarding the medical engineering and the comfort and communication of the inpatients rooms. Every bed has a new “Cockpitsystem” with a telephone, a radio, a television, a bell and internet option.
The planning of our office incorporates the following subsections:
heating, sanitary, cooling, ventilation, heavy current engineering, communication engineering and safety engineering.

波恩大学综合诊所在其地块上建造了大量的新建筑物，也改整个建筑群的结构一个很大的建筑区时具有50和床位的耳鼻喉/眼科诊所新病房区。这个新住院部总投资额达14,000,000欧元，为德国之最。

这样一座建筑对于工作人员和病人来说是非常有吸引力的，可以得到更舒适敞的空间。

每个病房都拥有独立的加湿器。

建筑物在设备技术方面达到很高的要求，特别是在安全保障方面，以及防火噪声防护方面。

为了创造一个理想的气候环境并减少采暖能耗，采用了一种混凝土核心制冷技术。除了现代化的手术医疗技术设备，在病房的内的舒适度和互动性方面也引入了新元素。每个病床的配置一套驾驶室系统，有电话、广播、电视、护士呼叫和网络接口等功能。

我公司负责了以下设计工作：采暖、给排水、强弱电、安全保障系统。

innovations for buildings

competence

climate innovations

climate concepts	气候方案
HVAC concepts	设备方案
building physics of the building envelope	建筑围护结构的物理学研究
green buildings	绿色建筑
solar architecture	太阳能建筑
certification of building	建筑物认证
software tools for energy efficiency and certification of the building envelope	建筑围护结构能耗优化及认证软件

BBS INTERNATIONAL

BBS Engineers
BBS INSTITUT

Germany . China
德国 . 中国

Company for Engineering	结构设计
in	建筑物理及
Structural Design	改建技术
Building Physics	工程公司
Redevelopment-Techniques	
Institute for Research and Materials Testing	应用建筑物理
in	/建筑材料研究
Applied Building Physics and Building Materials	与材料检测研究院

The BBS is anxious to realize the current state-of-the-art in practice and consequently to give commands to the implementation.
The BBS INSTITUT supports the BBS INGENIEURBÜRO with laboratory tests while working on projects.
The characteristics of the building materials and their dependence on the accompanying situation are checked to develop an optimal concept regarding an economical point of view.

Complementary, we give advice to the development of new structures and materials. These new structures and materials will be optimized on the basis of preliminary studies which are based on scientific and practice-orientated research; also, we attend to them until launch.
We work on publicly promoted themes of research as well as concrete kind of questions of the industry and economy.

BBS一直致力于将最新的科技运用于实践之中，并对项目的最终完成给予指导。
BBS研究院为BBS工程事务的项目处理工作提供了必要的实验支持。

我们会对建筑材料特性及其适用情况进行检查，并以此为基础，从经济角度出发拟定一个最优方案。

需要补充说明的是，我们还从事新型建筑结构与材料研发的咨询工作，以科学的、面向实践的研究为基础对结构及材料进行初步研究，并在初步研究的基础上将其优化。我们会不断致力于此，直到将产品引入市场。

我们也从事国家资助的研究项目， 比如有关工业和经济的具体课题。

climate innovations

BBS INTERNATIONAL

services to develop a building concept
建筑方案研发的工作内容

Optimization of the building shell
optimization of the energy needs
separated according to the heating period and the cooling period
optimization of the building components with regard to the investment- and running costs, the user suitability, the durability and the building maintenance

Certification of the building (without the plant technology)
calculation according to physical balance
evaluation according to a stars rating system LEC

Development of an innovative climate concept
basis optimization with regard to the plant systems, the comfort, the investment costs, the running costs, the durability
heating system, cooling system, ventilation,
HVAC-plant systems and the generation of energy

Further services
design planning for the construction physics
heat protection, damp protection, fire protection, sound-proofing, acoustics
design planning for the house technology concept

建筑围护结构优化
能耗优化
分别针对采暖期和制冷期
按照投资及运营费用优化建筑构件
适用性、耐久性以及建筑维护

建筑物认证（不考虑建筑设备）
根据物理平衡公式计算
根据LEC星级体系评价

制定新型气候方案
基础优化，包括设备系统、舒适性、投资费用、运营费用及耐久性优化
采暖、制冷及通风的优化
暖通空调设备及能源转换的优化

其他工作范围
建筑物理方案设计
保温隔热、防潮、防火、噪声防护、声学设计
建筑设备方案设计

building physics



BBS INTERNATIONAL

guidelines for the planning and carrying-out from the point of view of the construction physics
基于建筑物理的设计和施工指标

User-specific requirements
- room climate
  - temperature of the air
  - surface temperature of the building components
  - relative atmospheric humidity
  - airspeed
- acoustics
  - sound damage on the building from the traffic
  - sound-proofing within the building
  - Room acoustics, reverberation of the rooms - dampness
- optics
  - daylight
  - artificial light
- requirements to the building components
  - wintry heat protection/summary heat protection
  - energetic economy in winter/in summer
  - damp protection indoors/outdoors
  - sound-proofing of the building component
  - sound absorption of the surfaces of the building component

Fire protection technological requirements

Further requirements
- efficiency of the building component cooling system/ cooling ceiling

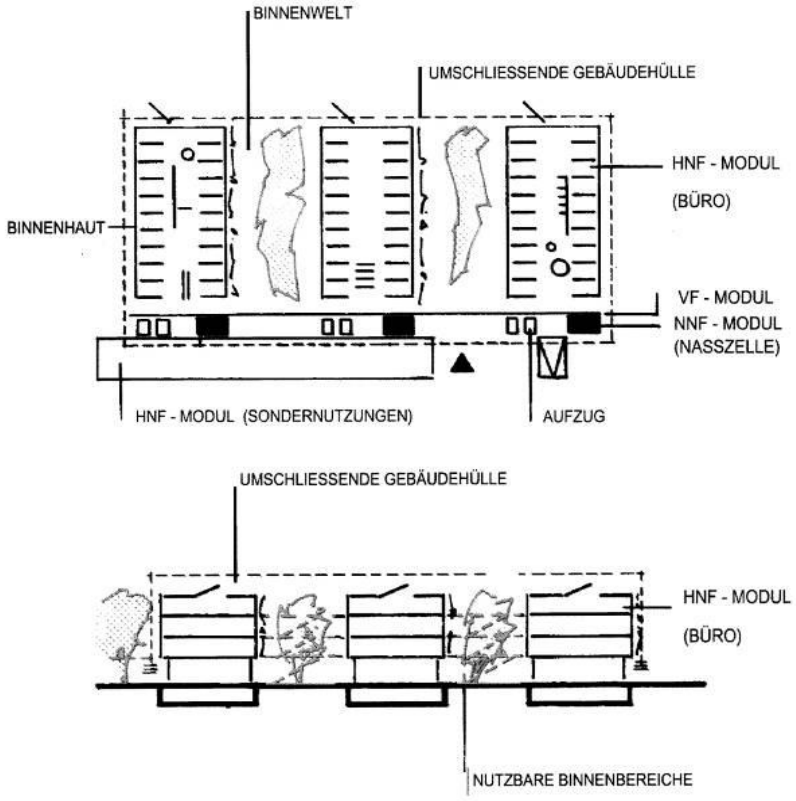
客户特殊要求
- 室内气候
  - 空气温度
  - 建筑构件表面温度
  - 空气相对湿度
  - 空气流速
- 声学
  - 交通噪声对建筑物的影响
  - 建筑物内部噪声防护
  - 室内声学
- 光学
  - 自然光
  - 人造光

针对建筑构件的要求
- 冬季保温 / 夏季隔热
- 冬季 / 夏季节能
- 内部 / 外部防潮
- 建筑构件噪声防护
- 建筑构件表面吸声

防火要求

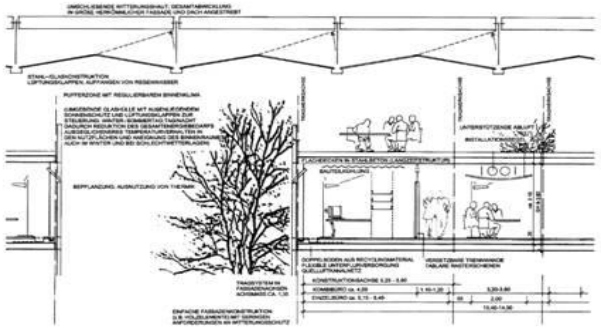
其他要求
- 建筑构件制冷 / 辐射冷吊顶的工作效率

climate innovations



BBS INTERNATIONAL

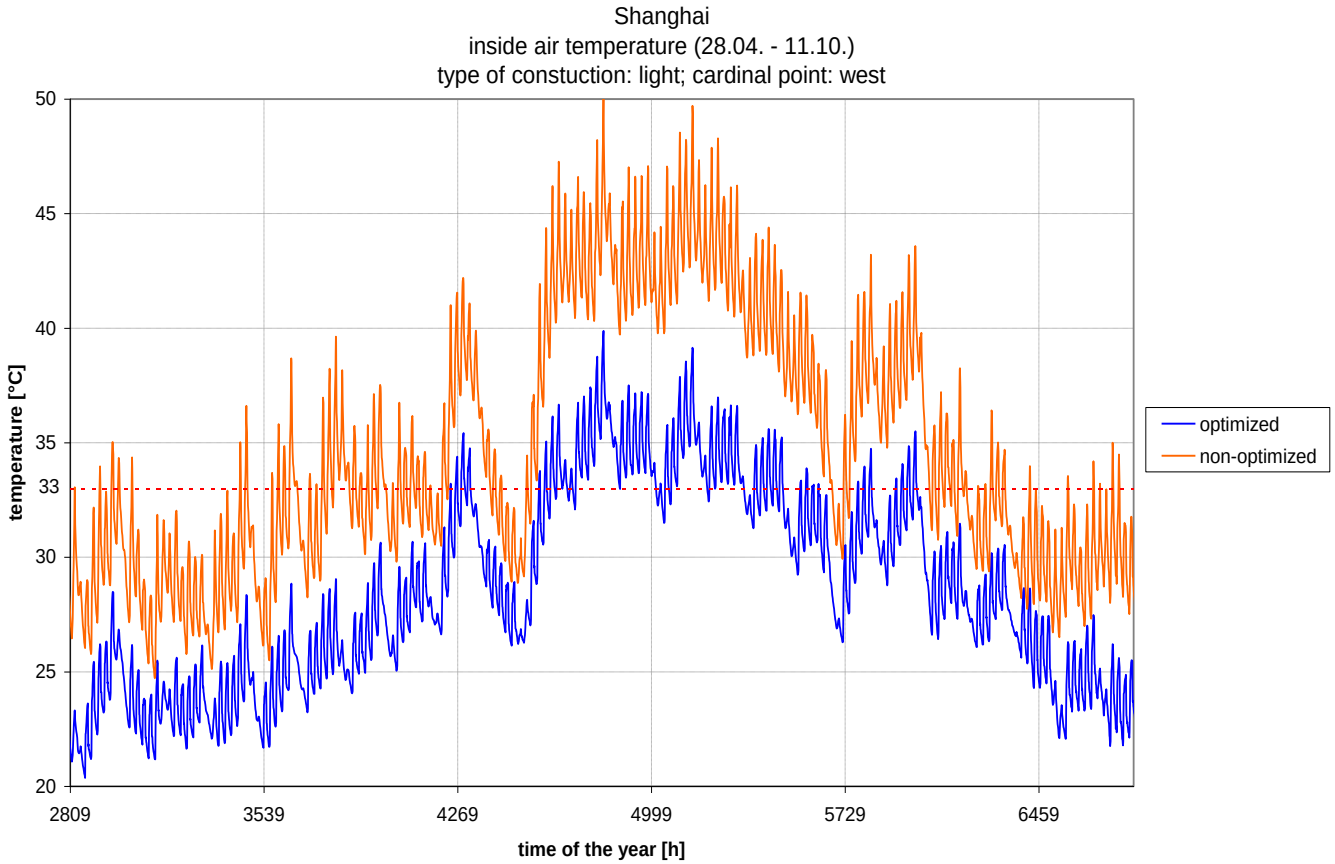
Planning for a climate- and energy concept, sound-proofing, room acoustics, daylight
气候和能源方案、噪声防护、室内声学、自然光设计



climate innovations

BBS INTERNATIONAL

internal temperature
building optimized 5* .... non optimized 1*
室内温度
建筑物 已优化 5* .... 未优化 1*



climate innovations

BBS INTERNATIONAL

cladding – variations – example of a glass cladding
幕墙 – 两种方案 – 玻璃幕墙示例

DF - cladding with opacity in the space between the fronts
g eff. = gGlass outdoors × gOpacity × gGlass indoors
g eff. = 0.65 * (0.25...0.35) * 0.8
g eff. = 0.13...0.22 ..... Max. possible
g-value Glass: 0.25..0.28
k-value Glass: 1,2

SF – single-leaf cladding with a high-quality sun protection glazing and opacity/glare shield indoors
g eff. = gGlass × gOpacity indoors
g eff. = (0.25...0.35) * 0.8
g eff. = 0.20...0.28
g-value Glass: 0.21..0.23
k-value Glass: 2,0

DF - 双层幕墙。内外幕墙间设有遮阳设备
g 有效 = g玻璃外部 × g遮阳 × g玻璃内部
g eff. = 0.65 * (0.25...0.35) * 0.8
g eff. = 0.13...0.22 ..... 最大可能值
g玻璃: 0.25..0.28
k玻璃: 1,2

SF - 单层幕墙。配备高效防太阳辐射玻璃，幕墙内面设有遮阳设备
g eff. = g玻璃 × g内遮阳
g eff. = (0.25...0.35) * 0.8
g eff. = 0.20...0.28
g玻璃: 0.21..0.23
k玻璃: 2,0

physics innovations

BBS INTERNATIONAL

g-value - optimized according LEC
g值 – 已根据LEC优化

possible
可能的

not possible
不可能的

low energy certificate Standard 低耗能认证标准		★★☆☆☆	★★★☆☆	★★★★☆	★★★★★
	North 北	0,21	0,17	0,14	0,07
	South 南	0,21	0,17	0,14	0,07
	East 东	0,19	0,15	0,13	0,06
	West 西	0,19	0,15	0,13	0,06
	North 北	0,21	0,17	0,14	0,07
	South 南	0,21	0,17	0,14	0,07
	East 东	0,19	0,15	0,13	0,06
	West 西	0,19	0,15	0,13	0,06

physics innovations

BBS INTERNATIONAL

k-value - optimized according LEC
k值 – 已根据LEC优化

low energy certificate Standard 低耗能认证标准		★★☆☆☆	★★★☆☆	★★★★☆	★★★★★
k-value **k值**	Window 窗户	2,50	2,00	1,00	0,40
	Basement 地下室	4,00	2,00	1,50	1,00
	Ceeling (18th Floor) 吊顶 (第18层)	3,00	1,50	1,50	1,00

possible
可能的

not possible
不可能的

climate innovations

BBS INTERNATIONAL

climate- and energy strategy
气候和能源方案

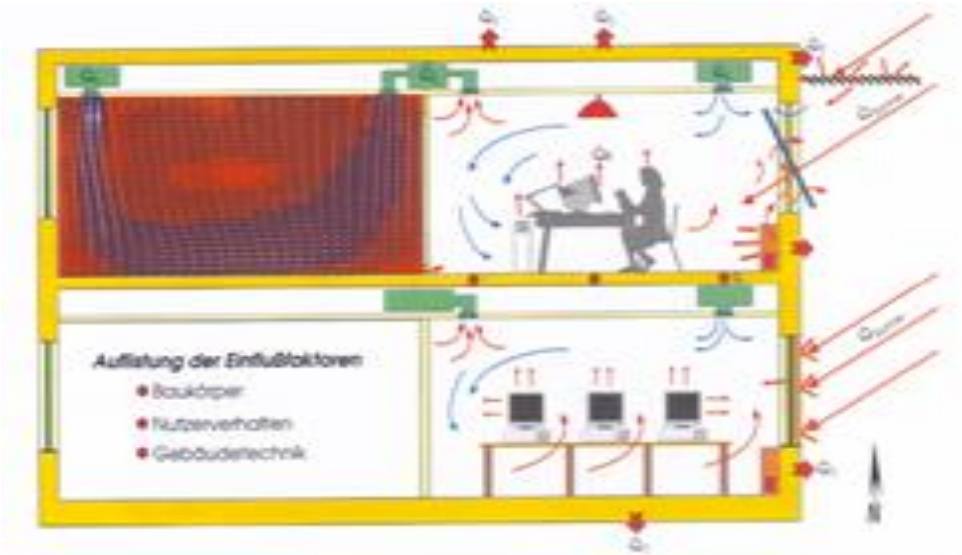
climate innovations

BBS INTERNATIONAL

building simulation calculations
numeric calculation for a determination of the temperature and energy reaction of the building
建筑物模拟计算
通过数字计算法确定建筑物的温度和能耗变化

Determination of the temperature- and damp reaction in buildings	建筑物内温度和湿度变化的确定
multi-zone model	多区域模型
temporal changeable conditions	随时间可变的状态
illustrations of future real events	展示未来真实情况

Dynamic building simulation	建筑物动态模拟
climate data (reference year)	气候数据 （典型年）
building model (geometry, building part, building material)	建筑物模型 （几何形状、建筑构件、建筑材料）
use of the building (occupancy, technical gadgets, illumination)	建筑物使用方式 （人员配置、设备仪器、灯光照明）
building technology (heating, ventilation, cooling system)	建筑设备技术 （采暖、通风、制冷）

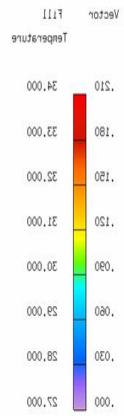


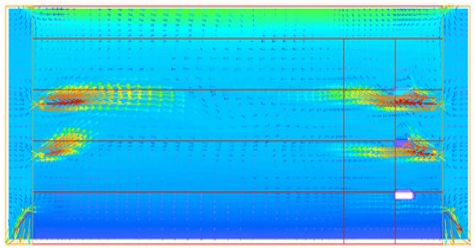
climate innovations

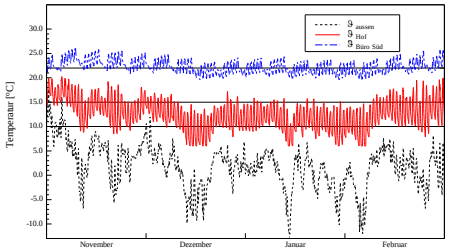
BBS INTERNATIONAL

climate concept for courtyards with plants
室内花园气候方案

Summer day, calm (7.00 am - 6.00 pm)	无风的夏季日 (7.00 - 18.00)
additional air via the opening wing on level 1	通过第1层的开启设备进风
outgoing air via the opening wing on level 4	通过第4层的开启设备排风
control $\vartheta_{courtyard}$ > 19°C and $\vartheta_{outdoors}$ < $\vartheta_{courtyard}$	控制$\vartheta_{室内花园}$ > 19°C 且 $\vartheta_{室外}$ < $\vartheta_{室内花园}$
summer night, calm (6.00 pm - 7.00 am)	无风的夏季夜 (18.00 - 7.00)
additional air via the opening wing on level 2	通过第2层的开启设备进风
outgoing air via the opening wing on level 4	通过第4层的开启设备排风
outgoing air via the RWA above the atria	RWA 及中庭排风
control $\vartheta_{courtyard}$> 19°C and $\vartheta_{outdoors}$ < $\vartheta_{courtyard}$	控制 $\vartheta_{室内花园}$ > 19°C 且 $\vartheta_{室外}$ < $\vartheta_{室内花园}$
Task	工作任务
no heating	无采暖
max. use especially during the time in between the seasons	最大限度使用，特别是在过渡时间段







climate innovations

BBS INTERNATIONAL

climate concept for an office
办公室气候方案

Comfort of a person in a room
- indoor temperature (temperature, relative dampness, airspeeds)
- activity level, clothing, duration of stay
- fresh air demand of the indoor areas 60m³/h
- limit of the heating temperature
- during the day 22°C
- at night 19°C
- average limit temperature for the office
- comfortable 27 °C
- hot 29 °C

Variation 1 – without cooling system
- natural ventilation via a window /courtyard with plants
- with and without controlled outgoing air from the office

Variation 2- with a cooling via the cooling system of the building part/ceiling
- limit of the cooling temperature during the day: 26°C

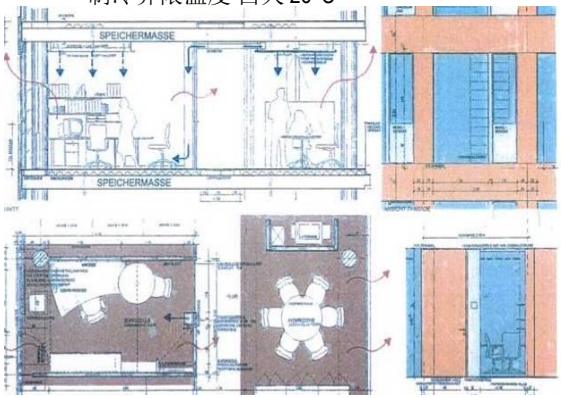
Variation 3 with a cooling via the cooling system of the building part/ceiling
- coordination of the additional air
- limit of the cooling temperature
- during the day: 26°C

室内的人体舒适度
- 室内气候 （温度、相对湿度、空气流速）
- 人体活动等级、衣着、停留时间
- 内部区域新风需求量 60m³/h
- 采暖界限温度
- 白天 22°C
- 夜晚 19°C
- 办公室平均界限温度
- 舒适 27 °C
- 温暖 29 °C

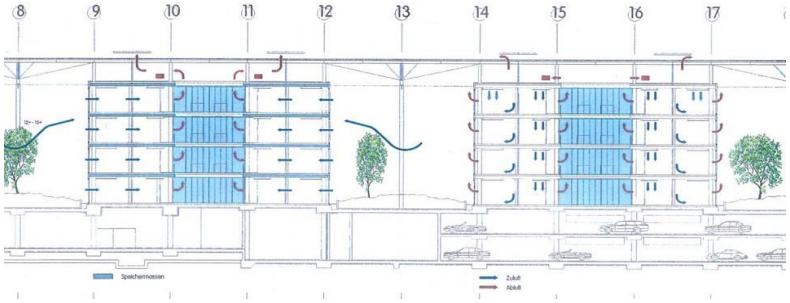
方案 1 – 无制冷
- 通过窗户 / 室内花园完成自然通风
- 办公室带有或不带有可控排风

方案 2 – 建筑构件 / 辐射吊顶制冷
- 制冷界限温度 白天 26°C

方案 3 – 建筑构件 / 辐射吊顶制冷
- 进风调节
- 制冷界限温度 白天 26°C



climate innovations



BBS INTERNATIONAL

ventilation concept for an office
办公室通风方案

Checking of the natural ventilation reaction
with / without controlled outgoing air
cooling of the office areas via cooling ceiling

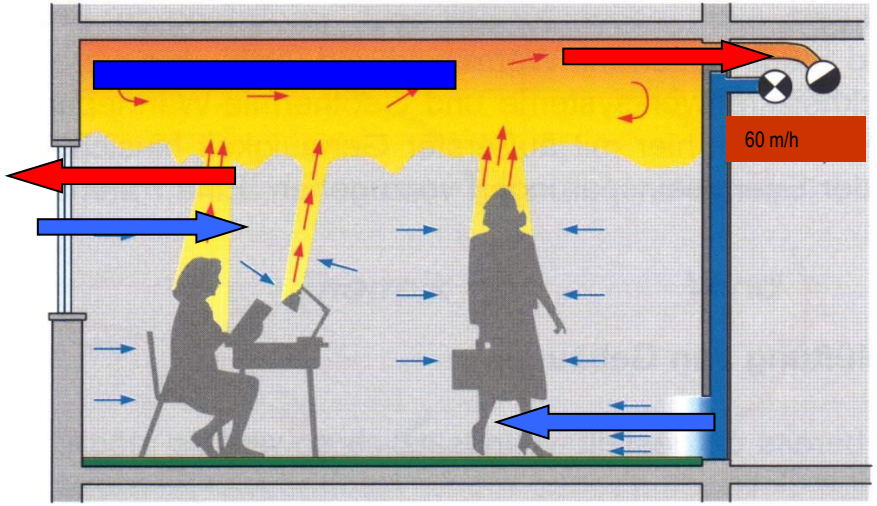
Ventilation system during the day
blowing in of pre-conditioned air into the room
outgoing air via the courtyards with plants or outgoing air via the ventilation of the room

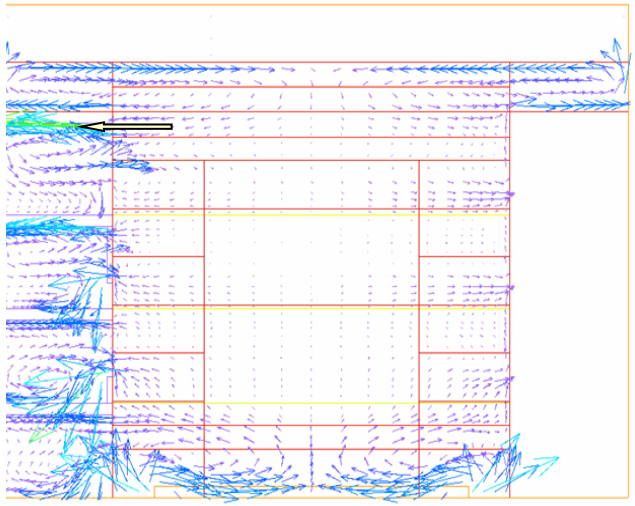
Ventilation system at night
window ventilation facing the courtyard with plants
outgoing air via the atrium
outgoing via the RWA

自然通风情况的研究
可控排风或非可控排风
办公区域制冷通过冷辐射吊顶

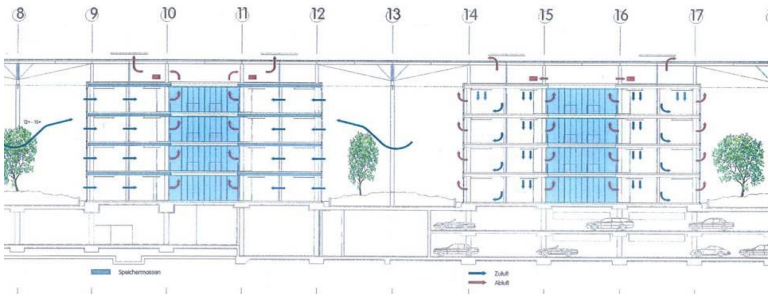
通风系统 白天
向室内送入事先调节好的新风
室内花园排风以及排风装置排风

通风系统 夜晚
窗户通风至室内花园
中庭排风
RWA排风



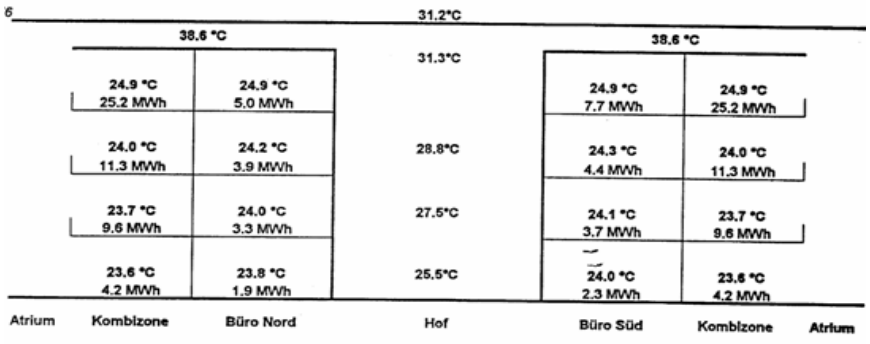


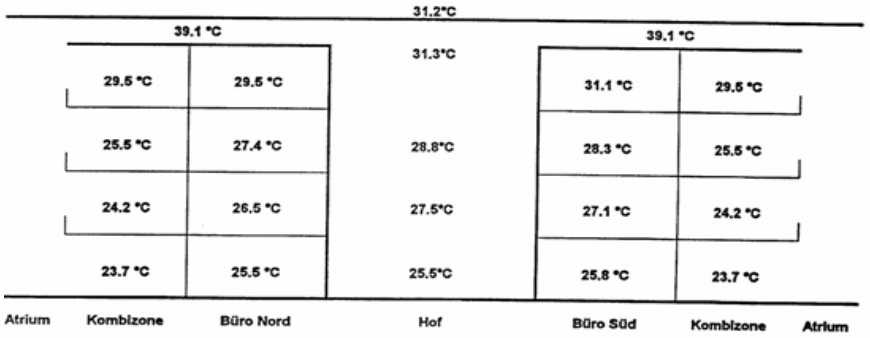
climate innovations

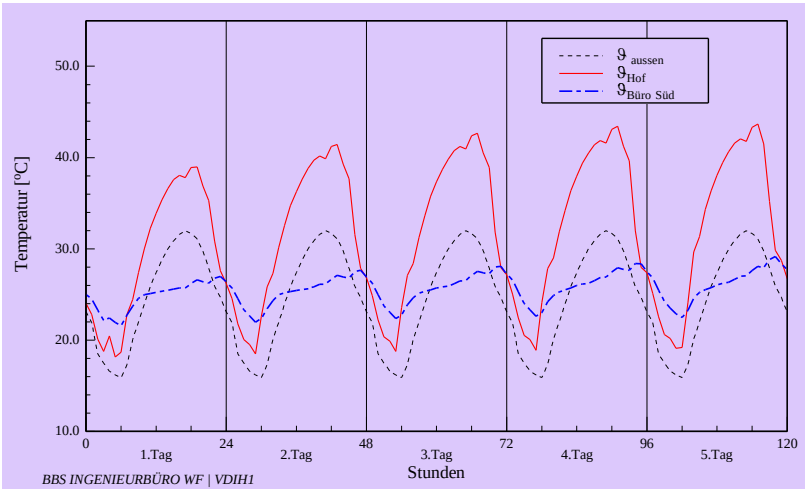


BBS INTERNATIONAL

temperature development in the building
建筑物内的温度变化







climate innovations

BBS INTERNATIONAL

regulation strategy ventilation systems
通风系统的控制方案

The blown-in cool air follows the movement of the sun going around the building

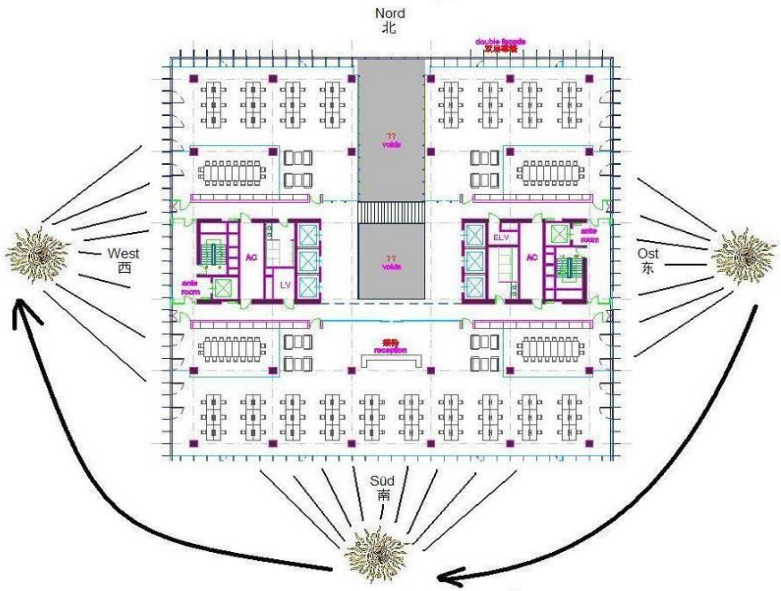
送入的冷空气量随阳光照射路径而变化

The blown-in air in the areas facing the sun is cooler than the blown-in air in the sidewalls of the building turning away from the sun/in the shade

送入的空气在向阳面温度低于背阴面.

Guidelines:
Circulating air > 6 times
The fresh air depends on the number of people in each zone
Valves regulate the air volume stream of the fresh air
Valves regulate the mixing relation of the (hot) circulating air with the (dry and cold) fresh air

技术要求：
室内空气交换率 > 6 h^{-1}
新风量取决于室内各区人数
阀门控制新风风量
阀门控制室内（暖）空气和（干、冷）新鲜空气的混合比例



通过阳光控制进风量量, 最大通风根据太阳位置自动调节

Additional air influenced by the movement of the sunlight, max. ventilation follows the position of the sun

climate innovations

BBS INTERNATIONAL

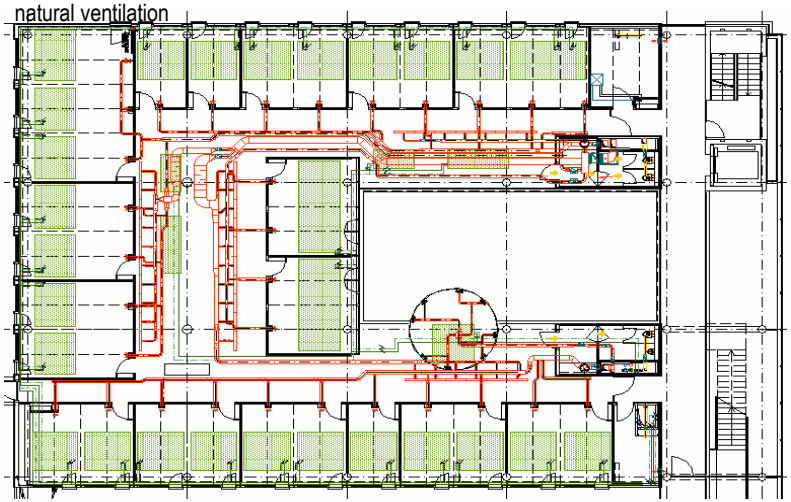
plant/equipment concept
heating, ventilation, cooling system
设备方案
采暖、通风、制冷

Task of the heating
- keeping of the norm-indoor temperature according to DIN 4701
- guarantee of the thermal comfort
- chosen combination from heating ceiling

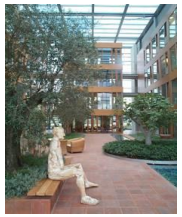
采暖要求
- 符合DIN 4701规定的室内温度
- 保证热舒适性
- 所选用的组合
- 采暖吊顶
- 暖气片 (tw.)

Task of the ventilation
- guarantee of the hygienically necessary outdoor volume stream
- drawing off of the heating loads
- minimization of the energy consumption
- chosen combination from ventilation with cooling system
- heating ceiling
- natural ventilation

通风要求
- 保证符合卫生要求所需的新风量
- 消除热负荷
- 能耗最小化
- 所选用的制冷通风组合
- 冷辐射吊顶
- 自然通风 (阀门通风)



climate innovations

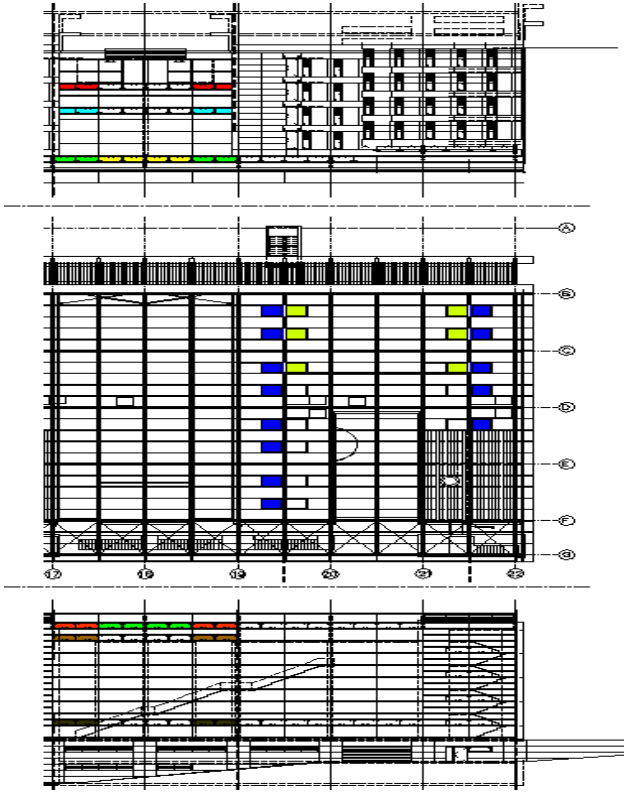


BBS INTERNATIONAL

plant/equipment concept for a courtyard with plants
室内花园设备方案

Natural ventilation
To make sure the climate for plants in courtyards with plants
Limitation of the temperatures in courtyards with plants in summer
Heating of the offices at night

自然通风
保证室内花园中植物所需的气候
限制夏季室内花园的温度
办公室夜间降温



local partner

中国伙伴 - 海波建筑设计事务所
local partner HPA – HAIPO ARCHITECTS

Shanghai

HAIPO Architects was founded in 1993 by Paul L. Chen AIA and Haiqing Wu AIA following their ten years of experience in the States. Initially beginning with ten people, HPA has since grown to over 100 people with offices in Shanghai and Beijing. This international team includes architects, planners, engineers and interior designers all committed to providing distinctive architecture which adds value to the local environment.

HPA consistently provides value by emphasizing design excellence in the firm's diversified portfolio including urban planning, office, commercial and residential buildings, educational, institutional and recreational facilities, and interior design. The collection of projects has brought acknowledgement to HPA through professional awards as well as publications.

With the firm's headquarters located in Shanghai, HPA has licensed architects from Germany, United States, and China. HPA has also acquired a Shanghai local design firm, Shanghai ZhongFu Architectural Design Company, which has local Grade A firm license for both architectural and engineering design practice.

HPA can provide the whole range of architectural services from schematic design to construction documentation. HPA can also act as the architect of the record.

HPA employs professionals on the fields of architecture, urban planning, interior, structure, mechanics and electrics.

Especially our M&E department has gathered vast experience on innovative energy saving design solution in the recent years. In cooperation with well acclaimed European companies the firm acted as a pioneer in implementing heat pump systems, cooled ceiling systems and more complex HVAC in its recent projects.

海波建筑设计事务所于1993年初成立于美国新泽西洲，并于1994年在上海成立了上海海波建筑设计有限公司。在过去的10年内，在中国承接了各种不同类型的工程项目，获得了业主、同行及权威机关的各种奖励和好评。公司设计的上海银辰数码大厦、上海电力调度中心大厦、上海皇都花园、上海维诗凯亚别墅区、北京万城华府、北京阳光上东二期、天津顺驰城市之光、昆明建设银行大厦等项目均获得业界和社会的好评。2003年上海虹桥21世纪城（第九城市）获得中国人居综合大奖。

海波建筑设计事务所共有八十多名各专业设计人员，其中包括多名来自于美国、德国、加拿大的注册建筑师。公司下设建筑设计部、结构设计部、设备设计部、室内设计部等四个分支，完全实现计算机绘图和电脑网络管理。公司主要合伙人陈立波先生和吴海青先生均为美国注册建筑师和美国建筑师协会会员（AIA）。

海波建筑设计事务所的服务领域包括：城市及区域规划设计，商业、住宅、旅游、教育、医院等各类建筑设计，以及室内设计。设计涵盖从概念方案到施工图设计各个过程。

海波不仅拥有强大的建筑设计，城市规划和室内设计团队，还拥有结构设计，机电设备设计团队。

特别是我们的M & E部门在最近这些年的实际设计中积累了丰富的经验，这使建筑设计过程更加合理适用。在与著一些名的欧洲公司合作过程中，海波展示了对复杂设备，如热泵系统，冷吊顶及HVAC系统的掌控和设计。

local partner

Lot 2-11 Bamboo Garden

竹园2-11办公楼

中国伙伴 - 海波建筑设计事务所
local partner HPA – HAIPO ARCHITECTS

Shanghai

The project is located in Parcel 2-11-2B of Zhu Yuan District, south of the Century Road. It is a high-rise Class-A intelligent office building, with a total 80.0m height, which has 17-storey building on the ground, and a two storey basement. The total building area is 45,112 ㎡.

The Standard plan of the office building is a 51.9 m X 37.5 m rectangular. The first floor contains the lobby for the office, in the second floor is the cafeteria , the standard office building floor starts from the 3rd floor and goes up to the 17th floor. The Basement is used for parking and equipment.. The building is composed by using modern and clear architectural language and the effect of different materials. The façade has unique characteristics but at the same time, matches the skyline of Century Road.

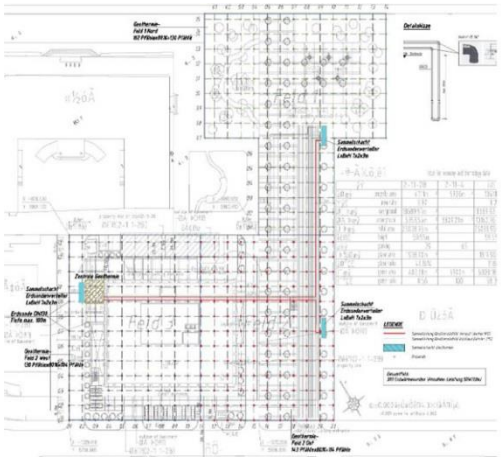
The façade language is composed by units that connect a stone surface framework and a glass curtain wall . Each unit crossing two floors. Various shadows are produced through the day by the depth of the stone framework, that also covers the interior space from the strong sunlight.

本项目地处世纪大道旁的南侧竹园地区内，在2-11-2B地块为一甲级智能化的高层办公楼，总高80.0m，主体建筑地上17层，地下二层。总建筑面积45，112㎡。

平面为一个51.9 m X 37.5 m矩形的高层办公大楼。 功能配置上，一楼为办公楼大堂，二楼西北区为简餐厅，三至十七楼为标准办公楼层。地下一，二层为设备用房及车库。

在建筑设计的意念上，运用简洁、现代的建筑语言，运用不同材料的对比，与周围的建筑群和谐地融合一起。立面上在形成自己独特建筑个性的同时，又充分尊重世纪大道的天际线景观。

立面采用石材框架的镀膜中空隔热玻璃幕墙体系，石材以每两层形成一个框架，体现立面设计的修长感，同时石材框架突出于墙面，使立面的立体感更强，也起到一定的遮阳效果。每个框架内运用透明玻璃，反光玻璃，铝板等不同材料的组合对比，体现立面的丰富光影效果。



local partner

Lot 2-11 Bamboo Garden

竹园2-11办公楼

中国伙伴 - 海波建筑设计事务所
local partner HPA – HAIPO ARCHITECTS

Shanghai

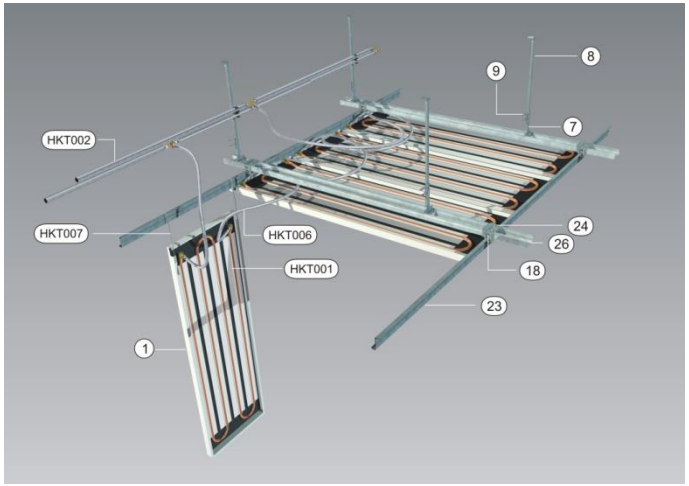
Energy saving of the project is especially prominent, contributing to the use of a ground heat pump system.

Though the "underground pipe heat exchanger ", ground heat pumps pump the recycled water which is used for cooling (or heating) central air-conditioning units to the inner ground. It can satisfy the requirement of cooling in summer and warming in winter by using the constant temperature of the inner ground.. (e.g. about 18 ° C Deep in 18 below the ground floor in Shanghai area) .

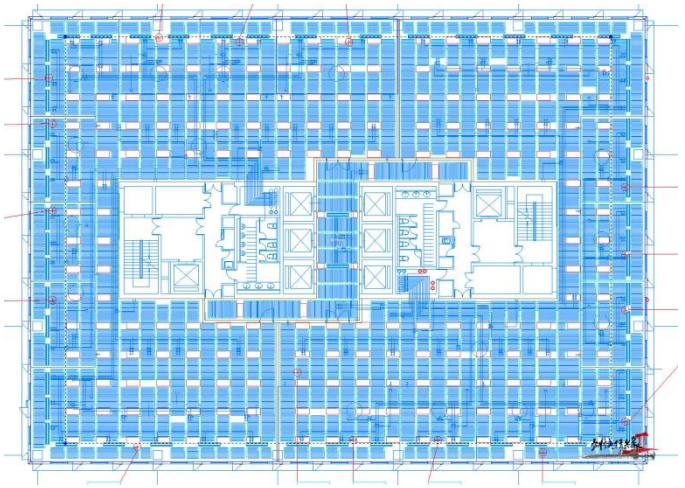
This technical system is totally different from that of the traditional central air-conditioning. It works well without the boiler room in winter and cooling towers in summer, and also needs no coal, gas or oil.

A Cool ceiling is used for the cooling and heating system using water as media. Compare to the traditional system, it has 40% reduction in energy consumption.

由于本项目能源源头采用地源热泵系统，在节约能源方面显得特别突出。
地源热泵通过“地下埋管换热器”，将用于中央空调机组冷却（或升温）的循环水引入地下，利用地下土层中较恒定的温度（如上海地区地下18米以下约18摄氏度），与土壤进行热量交换，达到机组夏季制冷、冬季供热的节能运行需要。该系统完全打破了传统中央空调的技术模式，冬天无需锅炉房、夏季不用冷却塔，不燃煤、不燃气、不燃油；也不同于采用地下水源的热泵系统，无需开采地下水，更不会对地下水造成污染。因此，制冷专家看好其大面积推广应用的巨大节能效益和环境效益，称之为“21世纪最有效的新技术”。
而作为本项目的另一节能亮点-金属板吊顶的空调末端，也具有相当多的节能功能。
作为顶棚辐射制冷采暖系统的一种-金属板吊顶，是利用水为媒介，把水管埋设在金属板内，通过金属吊顶构件和室内空气之间的温差向室内辐射能量而达到室内制冷采暖的目的。该系统的优点是无噪音，无风感，避免了传统空调系统中病菌通过风道的交叉感染。同时比使用 常规系统降低40%的能耗 。



1	LMD-E 200 Metal Ceiling Panel
7	Vernier hanger lower section
8	Vernier hanger upper section
9	Safety pins
18	Self-tapping screw
23	Hook-on profile
24	Connector for hook-on profile to suspension channel
26	Suspension channel



local partner

Lu Jai Zui Financial Centre

陆家嘴金融大厦

中国伙伴 - 海波建筑设计事务所
local partner HPA – HAIPO ARCHITECTS

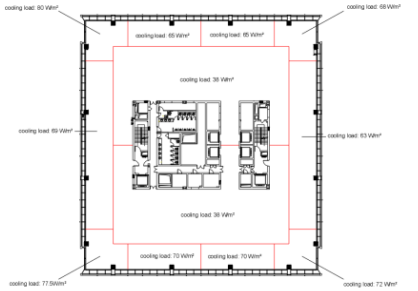
Shanghai

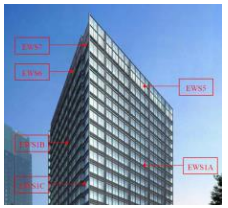
The Project is located in Lujiazui, Pudong Distict, with a total construction area of about 69,800 ㎡. It is 90 meters high, consists out of 19 stories (pus and 3 storey basement.) and has a 49.0mx 53.0m standard plan.
To adapt to the tenant flexible space requirement, 13.5m long steel beams are used as structure components over the office space. The façade is compose by “double skin” air circulation system with great capable of saving energy. This project also uses a cooled ceiling for the cooling and heating system.

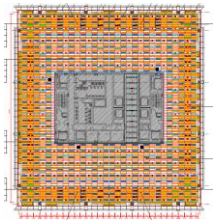
本项目位于上海市浦东新区小陆家嘴地区，银城北路以北，东园路以东，总建筑面积约69800㎡。本项目为甲级智能化办公楼，主楼高90米，地上十九层，地下三层。标准层尺寸49.0m x 53.0m，核心筒以外的结构受力构件布置上采用12和13.5米的大跨度钢结构，适应租户灵活分割的大空间办公。大厦的客户群主要为国际金融机构。办公楼外墙采用外循环双层呼吸式中空LOW-E玻璃幕墙，具有良好的节能效果。在建筑造型上，双层幕墙的空隙形成了一种虚语言，极大地丰富了建筑表面的语汇。双层幕墙结合可开启的内窗和百叶，构成了建筑生动的表皮形态，同时在外立面上又构成了独特的简约风格。

Address: Shanghai Pudong Lujiazui Ring Road
Area: 72,800 ㎡
Design / completion: 2006/2009

地址：上海浦东陆家嘴环路
面积：72，800㎡
设计/竣工：2006/2009







hvac and electrical engineering

Gas technology, water technology, sewage technology and fire fighting devices
heat-supply equipment, refrigeration technology, domestic water heating equipment, and ventilation and air-conditioning technology
electrical engineering
lift technology, conveyor technology and storage technology
kitchen technology, laundry technology and dry cleaning technology
medical engineering and laboratory engineering

天然气技术, 水处理技术, 污水处理技术和防火设备
供暖设备、制冷技术、家用热水设备
通风和空调技术
电机工程
电梯技术、输送技术和仓储技术
厨房技术、洗衣技术和干洗技术
医学工程和实验室工程

负责伙伴：克鲁斯国际工程事务所
responsible partner kruse international engineers

Germany, Russia, China

Engineer's society for hvac and electrical engineering

暖通和电气工程师协会

Technical building equipment

Our office looks after the client in a reliable way and success-oriented in all subsections of the TGA (gas technology, water technology, sewage technology, heat-supply equipment, domestic water heating equipment and ventilation and air-conditioning, electrical engineering, lift technology, conveyor technology and storage technology, user-specific plants or the central building control systems during all planning phases from the project idea via the finding-out about the basis to the looking after of the object and to the documentation supporting the client after having finished the construction to keep and to increase constantly the created additional value in future.

建筑设备技术

在整个设计阶段，从项目构想到项目调研直至项目管理和竣工验收，本公司全程为业主提供建筑设备领域的有效服务和针对性咨询，包括天然气技术、水处理和污水处理技术，供暖技术、用水加热技术和室内空气技术，电气技术、电梯设备和仓储技术，用户特定设备以及建筑控制技术，另外，我们还会在工程结束后支持业主，保证并不断提升创造的价值。

System integration

Modern, intelligently run complex buildings and plants require a subsection overlapping co-operation that integrates the involved components into a flexible general concept and that allows to communicate user-friendly with each other. We look after the client during the single steps like the requirements analysis, the concept development, the intersection definition, the integration into the general concept and the guarantee of a smoothly running of the building.

系统集成

现代化智能建筑群及设备要求各部分之间数据链接，这一链接将系统各部分集合在一个灵活的整体中并使其相互间根据用户需要自由交流。我们为业主在各步骤提供全程服务，如需求分析、方案制定、定义接入点、集成为整体并保证整个楼宇设备的顺利运行。

Facility Engineering und Management

Consulting, planning and engineer services as well as expert's reports that optimize the ran property regarding the secondary processes and the life cycle costs.

设备工程及管理

为设计任务和工程服务提供咨询以及制定专家鉴定书，在考虑了二次过程和生命周期成本后优化运营的房产。

Technical Controlling

Guarantee of the project aim by presenting clearly the cost situation, the service situation and the time scheduling as well as the analysis of the specifications (target/present situation comparison). Evaluation of the economy during the completion of the project. In addition the increasing interest in the sustainable development of property has become very important (e.g. the monitoring of energy indexes.

技术控制

通过将费用情况、任务情况和进度安排透明化显示以及详情分析（理论值/实际值对比）来保障实现项目目标，在项目进行过程中评价经济性，此外，对房产可持续性的不断关注也起了重要作用（例如监测能耗特征值）。

hvac and electrical engineering

负责伙伴：克鲁斯国际工程事务所
responsible partner kruse international engineers

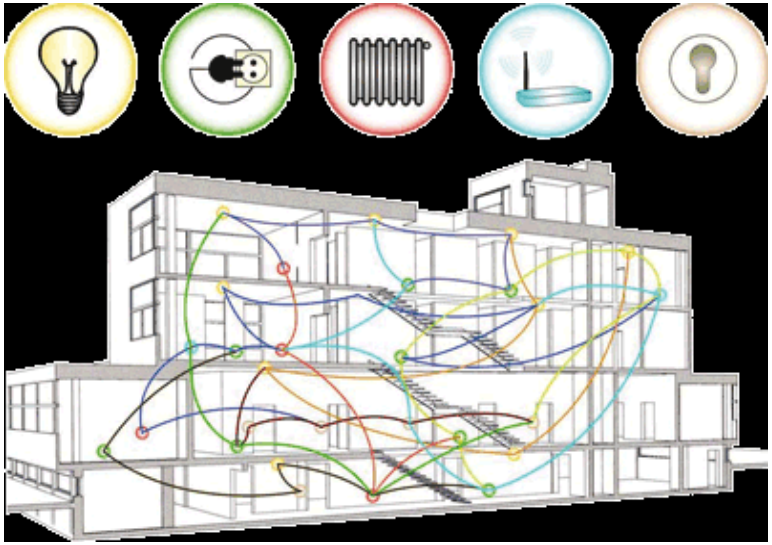
建筑设备和电气工程
hvac - and electrical engineering

Energy Engineering/Strategic Energy Management

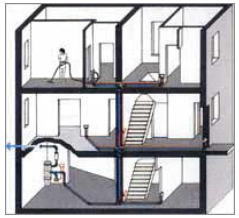
Thanks to an integrated attempt to a strategic energy management and facility management the property is used more ecologically, economically, flexibly and even more efficiently (e.g. because of energy optimization concepts). So the energy engineering becomes more and more important. What is more, renewable energy requires also an intensive energy management

能源工程 / 战略能源管理

通过能源和建筑战略管理概念的引入，建筑物被更经济、生态、灵活和有效的使（例如通过能源优化方案）。能源工程越来越得到重视。高质量的能源管理也需要可再生能源。



hvac and electrical engineering



负责伙伴：克鲁斯国际工程事务所
responsible partner kruse international engineers

气体、水、废水和消防技术
gas technology, water technology, sewage technology and fire fighting devices

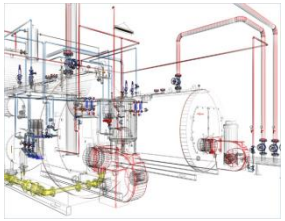
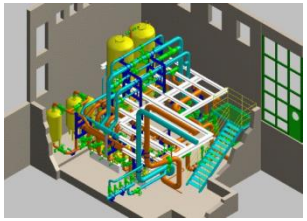
Planning and supervision of all systems and facilities for

Sanitary technology with treatment of water and reprocessing of sewage
Media technology, compressed air, vacuum cleaner facilities
Swimming pool technology
Fire-fighting systems (hydrant system, sprinkler system, foam extinguisher systems, gas extinguisher systems, etc.)

建筑设备设计和监控

卫生设备技术 净水供给设备和废水处理设备
媒体技术、压缩空气、吸尘设备
游泳池技术
消防设备（消防栓设备、洒水系统 、气体消防设备等）

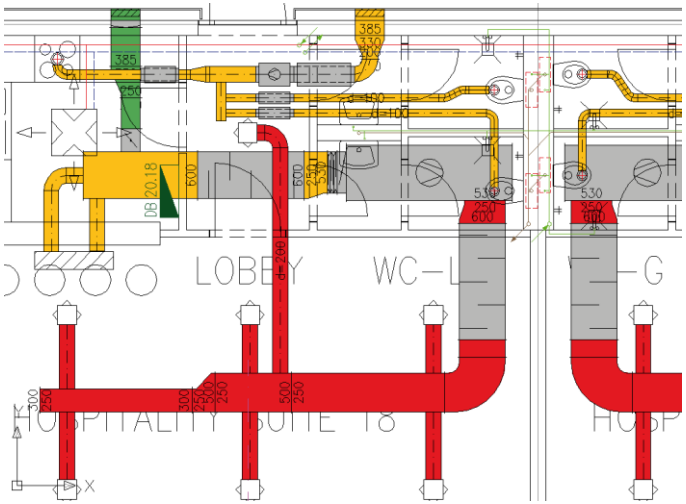
hvac and electrical engineering

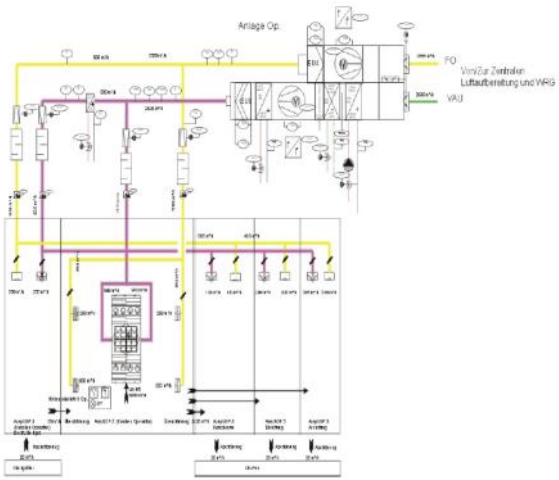




负责伙伴：克鲁斯国际工程事务所
responsible partner kruse international engineers

供暖、制冷、饮用热水和室内空气技术
hot-water supply, refrigerating, domestic water heating equipment and indoor air technology

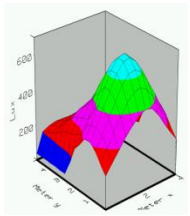
Planning and supervision of all systems and facilities for	**建筑设备设计和监控**
Heating and refrigerating	采暖和制冷
Hot water making system and thermal solar systems	热水供应设备和太阳能热力设备
Hot water pumps, BHKW	热泵、废热发电设备
Air-conditioning equipments, aeration systems, ventilation systems, smoke extractor	空调、通风、排风、排烟设备
Process air technological systems	作业空气技术设备
Refrigerating systems and cooling technology, cooling ceiling	制冷技术、辐射吊顶





hvac and electrical engineering



负责伙伴：克鲁斯国际工程事务所
responsible partner kruse international engineers

强电设备 – 信息技术 – 安全技术
heavy current plants - telecommunications – security technology

Planning and supervision of all systems and facilities for	**建筑设备设计和监控**
Heavy current systems (middle voltage and low voltage)	强电设备 (中低压)
Self-produced current systems (emergency power)	自备发电设备（紧急供电）
Low voltage switchgear systems	低压开关设备
Low voltage installations	低压设备
Lightening protection equipment and earthing equipments	防雷和接地设备
Illumination systems and light technological systems, emergency lighting	灯光照明设备、紧急照明
Telecommunication equipment and information technology systems ("low voltage") including in particular telecommunications and security technology	远程通讯和信息技术设备（“弱电”）以下特别分为信息技术和安全技术
Photovoltaic systems	光电设备
Telecommunications technology	**信息技术**
Intercoms	对讲设备
Loudspeaker systems (ELA), announcement equipments	音箱设备、广播设备
Aerials systems	天线设备
Computer networks to connect the PCs to the telephone line	联接电脑和电话的计算机网络
Radio systems for the building automation	建筑自动化无线系统
Security technology	**安全技术**
Alarm systems	报警设备
Lightening protection systems	防雷设备
Protection against fire technology (unlike the structural fire protection)	防火技术（与建筑防火有区别）
House alarm systems	房屋报警
Access control	入口监控
Building automation	建筑自动化

hvac and electrical engineering

负责伙伴：克鲁斯国际工程事务所
responsible partner kruse international engineers

电梯、传送和仓储技术
lift-, conveyor- and storage technology

Planning and supervision of all systems and facilities for **建筑设备设计和监控**

Passenger lifts and goods lifts	载客、载货电梯
Escalators and moving pavement	扶手电梯和传送带设备
Pneumatic dispatch systems	管道信息设备
Crane equipments and hydraulic ramps	起重设备和升降台设备

hvac and electrical engineering



负责伙伴：克鲁斯国际工程事务所
responsible partner kruse international engineers

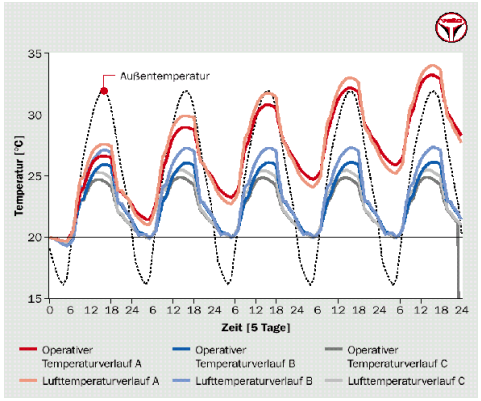
厨房、盥洗室和化学清洗技术
医学和实验室技术
kitchen-, laundry- and dry cleaning technology
medical engineering and laboratory technology

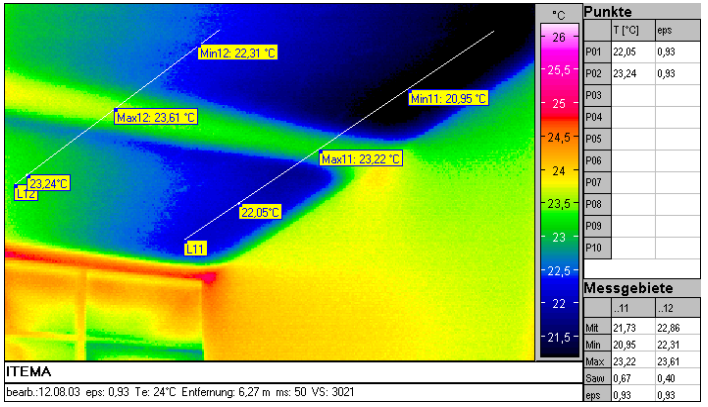
Planning and supervision of all systems and facilities for	**建筑设备设计和监控**
(canteen) kitchen technology	（大型）厨房技术
Laundry systems and dry cleaning systems	盥洗和清洁设备
Medical equipment, laboratory equipment and swimming/bathing technology	盥洗垃圾处理设备
Filling station equipments and car-washes	医学、实验室和卫生间设备
Rubbish dumping systems and paper dumping equipments	加油站和清洗设备
	垃圾和废纸处理设备

hvac and electrical engineering

负责伙伴：克鲁斯国际工程事务所
responsible partner kruse international engineers

混凝土核心激活
concrete nucleus activation





Punkte

	T [°C]	eps
P01	22,05	0,93
P02	23,24	0,93
P03		
P04		
P05		
P06		
P07		
P08		
P09		
P10		

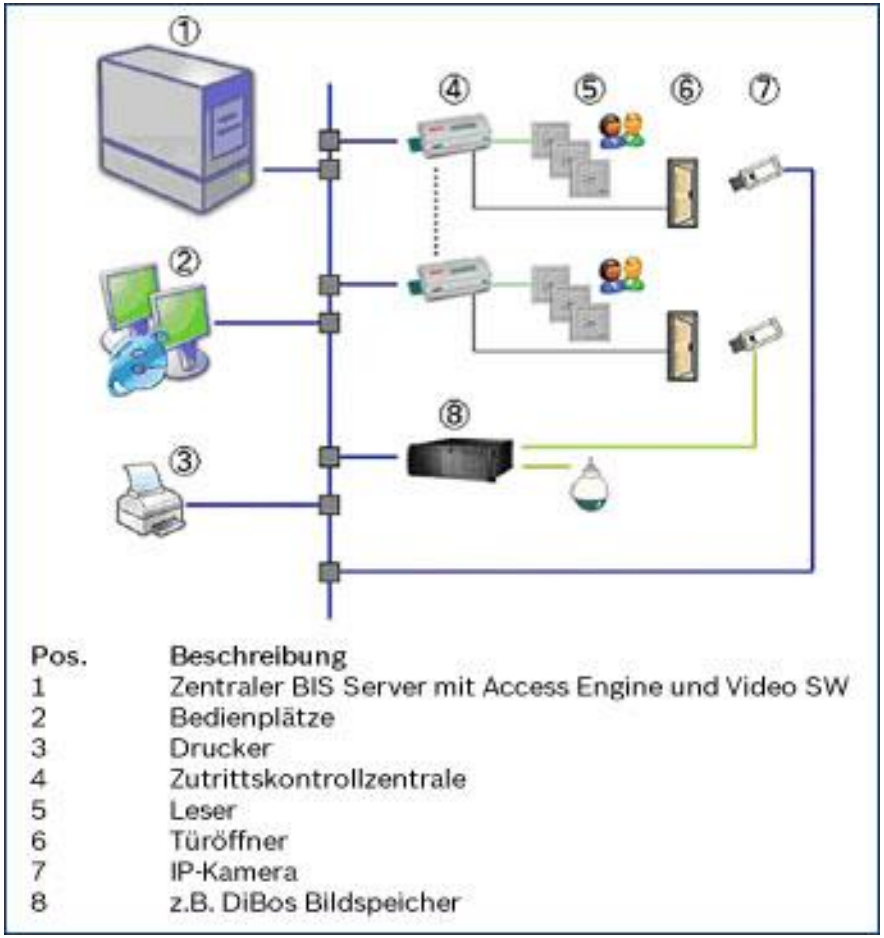
Messgebiete

	..11	..12
Mit	21,73	22,86
Min	20,95	22,31
Max	23,22	23,61
Sawi	0,67	0,40
eps	0,93	0,93

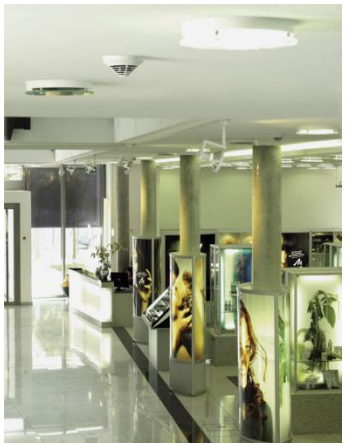
hvac and electrical engineering

负责伙伴：克鲁斯国际工程事务所
responsible partner kruse international engineers

建筑物管理 / 建筑物安全
building management/ building security



Pos.	Beschreibung
1	Zentraler BIS Server mit Access Engine und Video SW
2	Bedienplätze
3	Drucker
4	Zutrittskontrollzentrale
5	Leser
6	Türöffner
7	IP-Kamera
8	z.B. DiBos Bildspeicher



certification for buildings

software

Low Energy Certificate

http://www.lowenergycertificate.com

The evaluation programme LEC

LEC (Low energy Certificate) is a planning tool to evaluate the energetics of buildings. The programme was developed by the BBS INSTITUTE led by Prof. Dr. -Ing. Hans-Peter Leimer in cooperation with the Hefei University (Anhui/China) and the University of Applied Sciences and Arts, HAWK, (Hildesheim/Germany). The development was completed by the support of and cooperation with econet (China) and PKPM (China).

Thanks to the evaluation programme it is possible to evaluate nearly all building types and parts of a building with regard to their energetic quality separately after the heating period and after the cooling period.
The examination of the buildings with regard to the regional climate conditions is based on a pure physical basis. In this context it is important to mention that the calculations are exclusively based on results of (Lösungen der) wärmetech-nischen Bilanzgleichungen.

The basis for the evaluation of the heating period is a comparison with similar buildings (Referenzgebäuden) that were in accordance with the method of build-ing according to the standard of the 80ies paying attention to each climatic region.
As far as the cooling periods are concerned, the evaluation is based on compari-sons with an optimal front defined as “kühlenergieneutral”.

The evaluation of the energy for cooling and heating (Wärme- und Kühlenergie-bedarf) are re-evaluated, classified and shown with regard to certain criteria. The result of the energetic verification is presented with a simple star system. An in-crease of stars clearly shows the energetic quality of the building, which means that the user can immediately recognize the energetic quality of the building thanks to a simple illustration.

莱默建筑设计工程咨询（上海）有限公司
BBS INTERNATIONAL CHINA Co. Ltd.

建筑围护结构能耗优化及认证软件
Computer Program for Energy Efficiency and Certification of the Building Surface (Envelope)

LEC (Low Energie Certificate)
是一种建筑能耗评价设计工具。此软件在汉斯-皮特·莱默教授的领导下，由BBS INSTITUT与合肥学院（中国安徽）、希尔德斯海姆应用科技大学（德国下萨克森州）、东南大学（中国南京）和Sinobau e.V.（中国上海）共同合作研发。在研发过程中也得到了来自中国德中生态商务平台（中国）和中国建筑科学院（上海分院）的合作帮助和大力支持。

利用此评价软件几乎可以对所有类型的建筑物和建筑构件根据其能耗情况，分别对其在采暖期和制冷期内进行评价。 建筑物的评价是在考虑当地气候条件的情况下，在纯建筑物理学的基础上进行的。这里的计算都是基于热工技术平衡方程的解。

评价采暖周期的基础是一些可比参照建筑物，这些建筑物是按照中国上世纪八十年代的标准建造的。制冷周期的评价则对比符合“无制冷能耗”标准定义的最优化的建筑物外墙立面。

采暖能量需求和制冷能量需求的评价是考虑了确定的数值标准权衡、总结和制定的。能耗评价的结果则用一个简单明了的星级体系来表示。这里很显然的星数越多就代表建筑物的能效标准越高，这样用户对于建筑物能耗质量评价就一目了然。

PAVILION of INNOVATIONS
German Centre Shanghai
88 Keyuan Lu, Pudong
Shanghai 201203 China

Tel: +86 (0) 1891 7998 179
shanghai@bbs-international.com
www.bbs-international.com

创新展馆
德国中心
科苑路 88 号，浦东
201203 上海 | 中华人民共和国

电话：+86 (0) 1891 7998 179
shanghai@bbs-international.com
www.bbs-international.com