

固体废弃物在海绵城市建设中的应用

Application of Solid Waste in Sponge City Construction

福建泉工股份有限公司

制砖一体化解决方案运营商

We Provide Integrated Solutions
for Block Making

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Serious Issues in Cities 城市突出环境问题

Destroyed
Water
Circulation
水循环破坏

Heat-Island
Effect
热岛效应



Smog
and
Haze
雾霾



Drought
水枯竭



Foundation
Settlement
沉降



Water
Floating
城市内涝



一、海绵城市建设的背景

Background of Sponge City Construction

Solutions 解决方案



固废资源化形势分析

Analysis on the situation of solid waste



矿山固废现状Solid Mining Waste

- Annually 1 billion tons of solid mining waste produced in China

我国年产生**10亿吨**

- Storage volume : 60 billion tons.

储存量已达**600亿吨**

- Comprehensive utilization rate: ONLY 30%

综合利用率为仅为**30 %**

建筑固废现状Construction Solid Waste

- Annually 3.5 billion tons of construction waste produced in China

我国年产生**35亿吨**

- Storage volume : 7 billion tons.

储存量已达**70亿吨**

- Space taking : 500 million m²

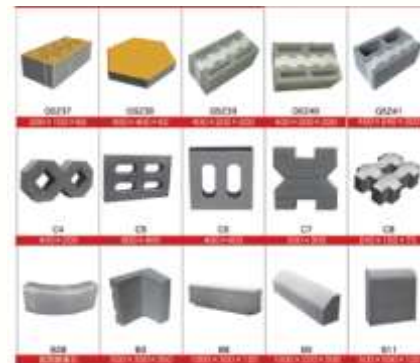
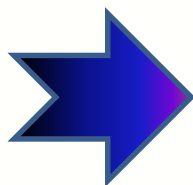
占地面积**5亿m²**

固废综合利用最佳处理方案Optimum solution for solid waste

泉工股份从提高产品附加值着手，致力于综合利用固废原材料，全自动智能化生产各类海绵城市透水砖、新型墙体材料、园林景观砖、路缘石、护坡砖、水工砌块、连锁砖等多种产品。

QGM ZENITH invented mobile multilayer block machine production line in order to promote comprehensive utilization of recycled resources.

The production line can produce new types of wall material, water permeable blocks, decorative blocks, curbstone, retaining blocks, interlocking etc. by using the solid wastes.



泉工股份实验中心 QGM Laboratory Center

针对当前固废综合利用所面临的问题，泉工股份专门建立研发实验中心，收集来自世界各地的100余种材料，包括废弃混凝土、废旧砂石、钢渣、矿渣等等，利用这些材料不断进行实验，开发新产品。

In response to the current problems faced by the utilization of solid waste, QGM has set up an R&D laboratory center to collect more than 100 kinds of materials all around the world, including waste concrete, waste sand, steel slag, coal slag, etc., using these materials for continuous experiments and development of new products.



泉工股份实验中心 QGM Laboratory Center



泉工股份实验中心为客户提供砖、砌块定制化方案，根据客户提供的材料及要求，不断试验，直至得出最佳制砖配合比。试验产品能够通过多种测试，包括抗压、冻融、透水性测试等等。

QGM Laboratory Center provides customers with concrete blocks customization. Based on the materials and requirements provided by the customer, QGM continuously carries out the test until the best ratio of blocks is obtained. The tested products can pass a variety of tests, including compressive strength, freezing test, water permeability, etc.

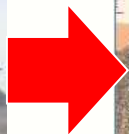
The block making process of solid waste 固废资源化利用制砖流程



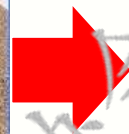
Collection
收集



Crushing
粉碎



Aggregates
粉碎后颗粒



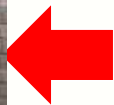
Batching
进料系统



Producing
生产成型



Curing
养护



Block samples
成品

三.固废生产透水砖的利用

Solid Wasted Used in Water Permeable Block Production



ZENITH 940 in Shanxi Province for water permeable paving stone

山西省策尼特940生产透水砖



临汾市华基建材科技有限公司
Linfen Huaji building materials technology co., LTD

单项冠军 行业标杆

三.固废生产透水砖的利用

Solid Wasted Used in Water Permeable Block Production

ZENITH 940 in Xiamen, Fujian Province
福建厦门策尼特940

Using solid mining & construction waste for water permeable paving stone
使用建筑及矿山废料制作透水砖



透水砖产品性能检查Test on water permeable paving stone:

The indexes such as compression strength, anti-failure load, freezing resistance and abrasion performance tested by authoritative department are all much higher than the national standard

经权威部门检测，由策尼特940生产的透水砖产品，在“外观质量”、“抗压强度和抗拆破坏荷载”、“抗冻性”、“耐磨性”等各项指标均高于国家标准，性能卓越！



检测报告

检测编号: JH2020060017000001

委托单位: 厦门宏生新材料科技有限公司

工程名称:

检测内容:

检测日期: 2020年06月10日

福建省建筑工程质量检测中心有限公司厦门分公司

透水砖抗压和透水性能检测报告 (出厂) 检验结果

检测项目	检测结果	标准要求
抗压强度	12.5 MPa	≥ 10 MPa
抗折强度	4.5 MPa	≥ 3.5 MPa
吸水率	15.5%	≤ 18%
透水系数	0.01 cm/s	≥ 0.005 cm/s
耐磨性	1.5 mm	≤ 2.0 mm
抗冻性	15 cycles	≥ 10 cycles

透水砖检测报告

检测项目: 抗压强度、抗折强度、吸水率、透水系数、耐磨性、抗冻性

检测结果: 抗压强度 12.5 MPa, 抗折强度 4.5 MPa, 吸水率 15.5%, 透水系数 0.01 cm/s, 耐磨性 1.5 mm, 抗冻性 15 cycles

检测结论: 该样品各项性能指标均符合国家标准要求, 合格。

(Block test report of Xiamen Honglusheng New Construction Materials Co.,Ltd)

Water permeable paving stone features:
透水砖特点

- 1.Using solid mining and construction waste as one of the raw materials; 使用建筑及矿山废料作为原料
- 2.Higher strength, flexural property: Abrasion resistant, longer life time; 强度高, 抗折性能好, 耐磨, 使用寿命长
- 3.Outstanding performance in water & air permeable. Rainwater penetrates into the ground rapidly, supply soil water and groundwater; 透水性及透气性能突出, 雨水可快速透过砖体供给土壤用水和地下水。
- 4.Reduce the pressure of urban drainage and flood control; 缓解城市积水压力, 加强洪涝管控
- 5.Reduce the noise generated by vehicles and create a quiet environment. 有效降低车辆通行噪音。



三.固废生产透水砖的利用

Solid Wasted Used in Water Permeable Block Production

Water Permeable 高透水性



Index of permeability $\geq 2.5 \times 10^{-2}$ cm/s, higher than national standard
透水系数 $\geq 2.5 \times 10^{-2}$ cm/s, 超国标

High Strength 高强度



Strength: C40, heavy-duty pavement
强度C40, 可设计成重载路面

Skid Resistance 防滑性高



BPN ≥ 65

Absorb Noise 隔音降噪



Max Absorbing Noise Ability: 4.7dB(A)
最大降噪值能达到4.7dB(A)

Liquidation of heat island effects 缓解热岛效应



Lowering surface temperature 3-4°C
平均降低地表温度3-4°C

Purifying Rainwater 净化雨水水质



Filtration of the impurities in rainwater
过滤、吸附雨水中的悬浮性固体、硫化物、氮氧化物等杂质

三.固废生产透水砖的利用

Solid Wasted Used in Water Permeable Block Production

Water permeable paving stone for Sponge City
海绵城市透水砖



无纺布透水管
Non - woven fabric
water permeable pipe

Green vegetation
绿化植被

Permeable
pavement system
透水路面系统



Water pool
蓄水池

Rainwater collection system
雨水收集利用系统

高附加值产品制作与应用Exploration on the promotion of additive value of blocks

Traditional products (blocks, bricks) are mainly used in ordinary buildings, infrastructure, etc., with low added value;
传统产品（砖，砌块）主要用于普通建筑，基础设施等，附加值较低；

Only through the promotion of deep processing technology, the added value of blocks can be effectively enhanced.
只有通过深加工技术的推广，才能有效提升砖的附加值。



Methods of promoting the added value of blocks 提高砖的附加价值的方式

1

After treatment on surface
表面二次处理

Polishing, coating washing and splitting etc.

表面二次处理包括水磨抛光，做旧，仿石材工艺，涂层，劈裂等

2

Face mix material matching
面料层材料选用

Through the collocation of different colors and processes of the surface materials, the brick surface presents a more outstanding decorative form, and its application scope is expanded

面料层材料采用不同色彩及加工工艺，砖体表面呈现较好的装饰形式，且应用范围不断扩大

3

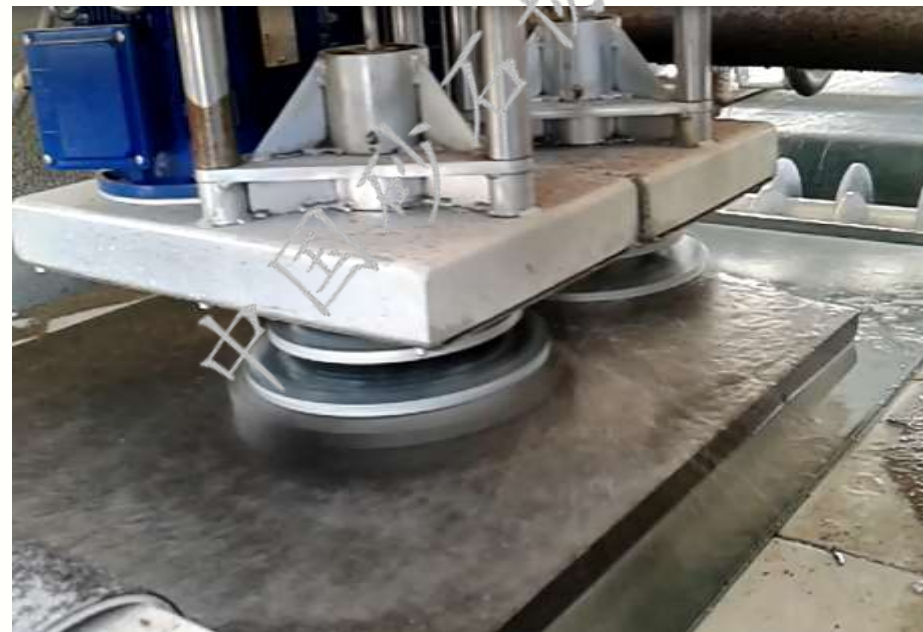
Increase block's functionality
提升砖体功能性

By changing the internal and external structure of the brick makes special functions, like interlocking, lego etc.

通过改变砖体内在和外部结构实现功能性能的提升，如拼接组合，乐高叠加等

Surface rough grinding technology

粗磨工艺处理技术



四.高附加值产品制作与应用

High value-added products processing and application

Surface carving technology

仿石材工艺处理技术(表面纹路处理)



Surface polishing technology
表面水洗抛光工艺处理技术



Multicolor surface technology
幻彩砖工艺处理技术



Surface striking process technology:

击打工艺处理技术:

Striking on the surface to make it uneven, creating a different form.

在表面上打击使其不平坦而具有不同的效果。

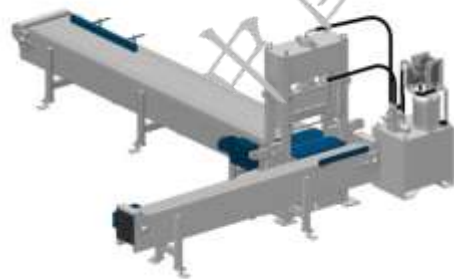


Splitting process technology:

霏裂工艺处理技术

Mainly used for retaining blocks, after splitting, the blocks look like natural stone, and could be used for external wall blocks and decorative blocks.

劈裂砖主要适用于砌块及挡土墙，产品经过霏裂处理后，外立面可达到天然石材的效果，外观无需再进行装修，可用于别墅的外墙、围墙及园林景观。



Surface aging process technology:

Blocks rotating in the aging equipment, then can be used in the old church, temples to match the style.

仿古工艺处理技术

仿古砖使用做旧设备进行滚动处理，使之外观缺菱断角；产品被广泛应用、铺设于古教堂、寺庙等古建筑广场，城墙进行搭配，风格协调统一。



Surface spray and coating process technology:

表面喷涂工艺处理技术:

Suitable for paving stone, the appearance is bright and beautiful, can be cleaned, so as to ensure the long life time.

适用于路面砖，保持外观亮丽，可清洗，延长使用寿命。



Applications of surface carved blocks 雕刻砖的应用



Applications of polished blocks
水洗，抛光砖的应用



Variety of common colors:
下列为常见颜色匹配:



谷黄色/Yellow



西瓜红/Red



古兰色/Blue



黑色/Black



虎皮金/Gold



白色/White



葡萄紫/Purple



金黄色/Gold

QGM Profile & Customers Project Report

Established in 1979 成立于1979

Formerly known as Quanzhou Municipal Engineering Machinery Factory, QGM is a national high-tech enterprise specializing in the research, development, manufacture and sales of block making machinery and concrete production equipment. 福建泉工股份有限公司，前身福建省泉州市工程机械厂，是一家专业从事制砖机械及混凝土设备研发、制造和销售的国家高新技术企业。

Worldwide Block Machine Enterprise 全球化砖机企业

QGM Group owns ZENITH in Germany, ZENITH mould company in Austria, Joint-venture Apollo in India. 福建泉工股份拥有德国策尼特公司、奥地利策尼特模具公司、印度阿波罗策尼特合资公司

I-Cloud Service 云服务

With the I-cloud service platform and advanced block making technology, QGM is able to provide customers with timely remote maintenance system. QGM has set up 25 offices in China and 10 overseas offices. There are over 140 patents and 6 National Invention Patents of QGM.

泉工智能装备云服务平台依托先进的互联网+制砖技术，为客户提供及时的远程维护。公司在国内建立25个办事处，国外建立10个海外办事处，拥有140多项专利，6项国家发明专利。



ZENITH in Germany:

德国策尼特:

- 1、Established in 1953, one of the most professional and famous block machine manufacturer. 德国策尼特公司始创于1953年，是全球最具知名度和影响力的混凝土砌块成型机及成套设备制造商。
- 2、Leading technology in pallet-free block machine manufacturing. 公司拥有世界领先的免托板设备制造技术。
- 3、The market share of ZENITH high-end block machine is increasing. 高端制砖机市场份额占有率不断提升。
- 4、The ZENITH products are famous for quality and safety, high degree of automation, low labor and high efficiency. 策尼特产品以质量和安全著称，自动化程度高，用工省、效率高，在国际上享有盛誉。
- 5、More than 8000 users in 108 countries.
在全球108个国家已拥有超过8000个用户。



五. QGM概况与客户案例精选

QGM Profile & Customers Project Report



The airspace of QGM new industrial park
泉工股份新厂区鸟瞰图—泉州台商投资区



总体鸟瞰图

单项冠军 行业标杆

► National Honor 国家荣誉



ZENITH 940 (Pallet-free)

Fully Automatic Mobile Multilayer Machine
策尼特940全能型混凝土制品成型机（免托板）



Pallet-free

Blocks can be produced directly on the floor or tray, easy to handle and maintain; Saving a lot of investment in pallets annually, and the following production cost is low, which is the development trend of the block making industry.



免托板设计

砖可以直接在地板或托盘上生产，方便快捷；每年可以节省大量的托板成本，生产成本低，这是整个制砖行业的发展趋势。



电气驱动 (400 V / 50 Hz), Modell 844 Standard 844 标准型

Energy saving :

节能:

Frequency conversion control, Total power of 940 is only 48kW;

Other equivalent equipment more than 110KW.;

940 can save about 60% of the electricity consumption, which equals 10,000 RMB on average per month.

变频控制, 策尼特940砖机总功率仅需48千瓦;

其他同行设备功率超过110千瓦, 940可节省约60%的电耗, 约10000人民币/月。

<u>回路驱动</u>	<u>Anzahl Motoren</u>	<u>Leistung</u>	<u>Nennstrom (A)</u>	<u>Gesamtstromaufnahme (A)</u>
P1 泵/标准尺寸	1	9.0 kW	19.80	19.80
P2 泵/标准尺寸	1	9.00 kW	19.80	19.80
P3 泵电机	1	5.50 kW	11.80	11.80
油冷却器 (FGSL-30-EGO)	1	0.75 kW	1.86	1.86
压头振动电机 (EVIRD ZE 35-2 K)	2	2.20 kW (4.40 kW)	3.35	6.70
振动电机 (HFZ 16015)	4	3.00 kW (12.00 kW)	6.90	27.60
振动台 - 送风机电机	2	0.12 kW (0.24 kW)	0.32	0.64
骨料机和面料机高度调节装置电机	2 + 2	0.70 kW (2.80 kW)	2.60	5.20 + 5.20
行走装置附加装置	2	0.55 kW (1.10 kW)	1.75	3.50
振动装置 - 撒沙器电机	1	0.15 kW	0.30	0.30
辊道	2	0.55 kW (1.10 kW)	1.45	2.90
<u>Steuerung</u> 控制 - <u>Allgemein</u> 一般	-	1.00 kW	3.00	3.00
<u>Gesamtwert</u> 总值:		47.04 kW		108.30

High compactness and compressive strength :

高密实性和高抗压强度

The vibration force is transferred directly to the product , which greatly improves the compactness and compressive strength of the product.

振动力直接传递到产品，大大提高了产品的密实性和抗压强度。



Low labour cost 低劳动力成本:

The production line carries out the fully automatic control.
The entire production line only needs 4 workers, and can realize remote control.

生产线可实现全自动控制。整条生产线只需要4名工人，可实现远程控制。



Multi-functional: 多功能:

Highest product up to 1 m:
最高产品高度可达1 m:

The equipment can produce high quality concrete cable slots, repair wells, prefabricated parts and even 1 meter high palisades in the most economical way.

940可生产多种高品质混凝土制品，如电缆槽，预制件，高度达1米的栅栏砖等，经济效益高。



I-Cloud Service 云服务:

- ◆ It is equipped with company's latest development of the "Intelligent equipment cloud service platform system." With online monitoring and early warning, remote diagnosis and maintenance and other functions.

混凝土砖机均配备公司最新研发成果——智能装备云服务平台系统，可实现在线监控，提前预警，设备故障远程排查及维修等功能。

- ◆ Through the cloud service platform, it can react quickly, give the solution in a short time, save the maintenance cost greatly

通过云服务平台系统，泉工股份可针对售后问题做出快速反应，并及时提供解决方案，降低客户维修成本。

- ◆ With data collection and analysis function, can provide customers with the best production proposal.

云服务平台可实现数据收集和分析功能，并为客户提供最佳生产方案。



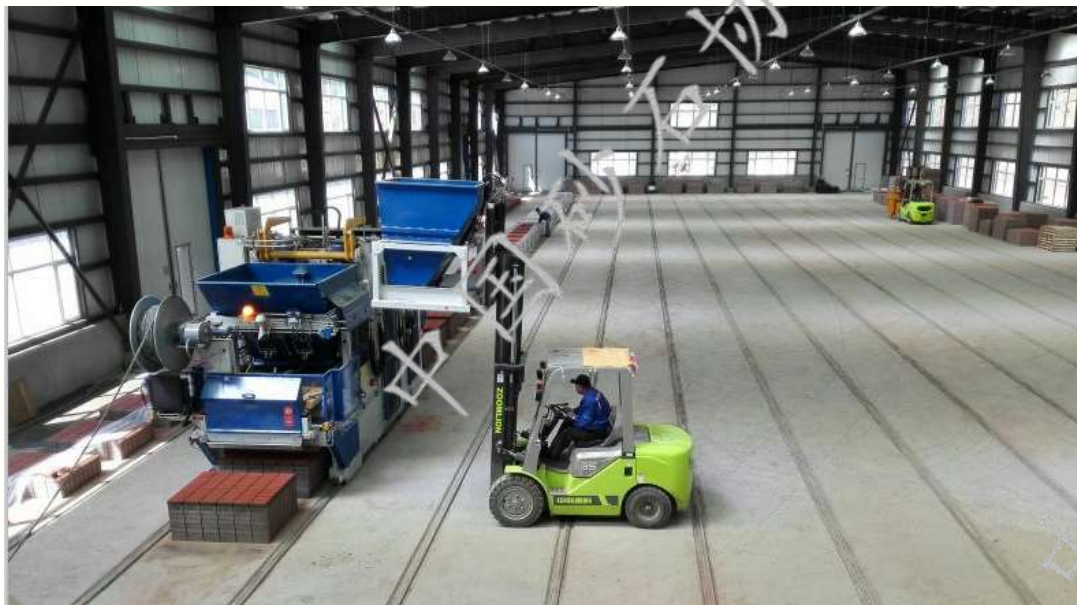
ZENITH 1500 策尼特1500

ZENITH 1500 is the state-of-the-art block machine, equipped with Servo Vibration System, which can produce all kinds of concrete products, like hollow block, paving stone, curbstone, permeable block etc. It carries a number of advanced intelligent equipment technology, high efficiency and low failure rate.

策尼特1500是业内拥有最先进设计的设备，配备伺服振动系统，可以生产所有类型的空心砖，路面砖，路沿石，透水砖以及其他混凝土制品。设备带有智能科技，具有高效率，低故障率特点。



ZENITH 940 for Jilin City Construction Group 吉林省建设集团 策尼特940



ZENITH 844 in Ghana,Africa
非洲加纳 策尼特844



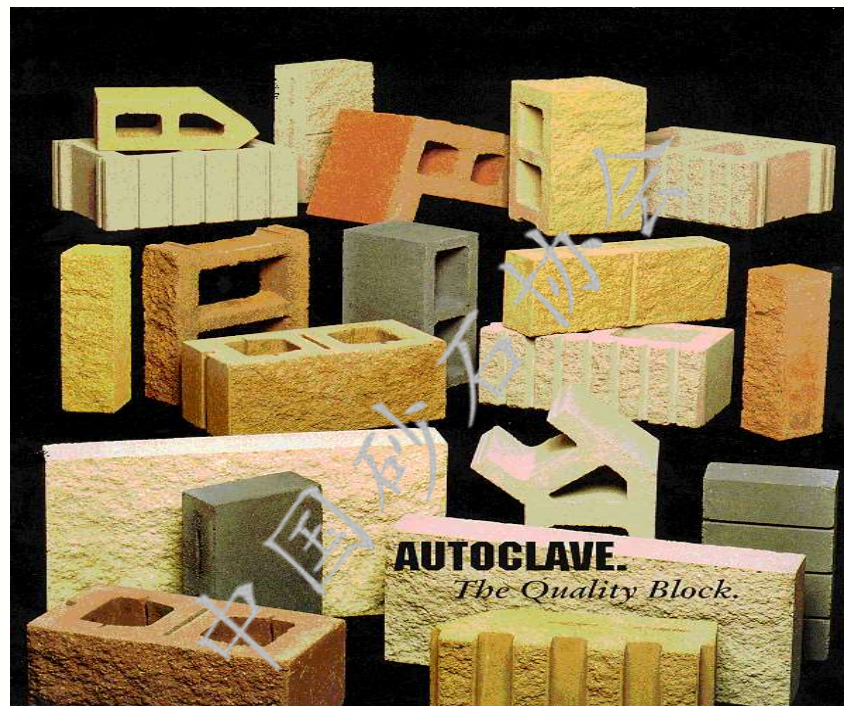
ZENITH 1500 Fully Automatic Plant in Germany 德国 策尼特1500全线



ZENITH 940 in Algeria 阿尔及利亚策尼特940设备生产现场
(Fly ash used as raw material 使用粉煤灰作为原料)



New Construction Block 新型建筑砖



AUTOCLAVE.
The Quality Block.

New Construction Block 新型建筑砖



Decorative Blocks 装饰砖



六. 制砖艺术

Block Making is Art

Municipal Products 市政产品



Municipal Products 市政产品



Grass Pavers 植草砖



Municipal Products 市政产品



Palisade 栅栏砖



Municipal Products 市政产品



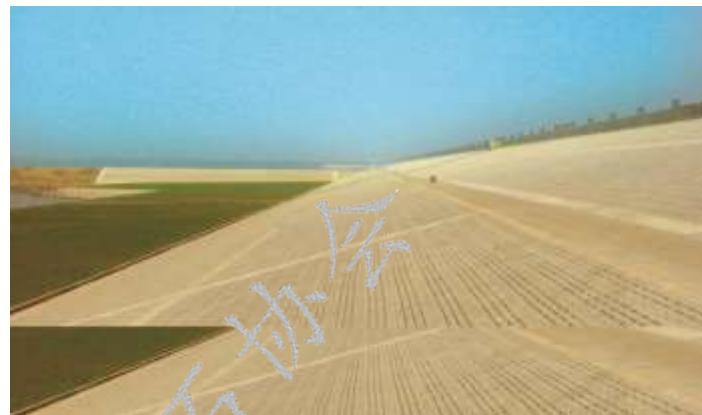
Curbstone
路沿石



Water Conservancy, Highway Slope Protection Blocks 水利工程护坡砖，高速公路护坡砖



Water Conservancy, Highway Slope Protection Blocks 水利工程护坡砖、高速公路护坡砖



Water Conservancy, Highway Slope Protection Blocks (Lego block) 水利护坡砖, 乐高砖



Garden Landscape Products 园林景观产品





Thank you for your attention
谢谢!

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手机号：13960399396



福建泉工股份有限公司
QUANGONG MACHINERY CO., LTD.