

竹缠绕复合材料在社会发展及南南合作中的 作用

Bamboo Winding Technology for Social Development and South-South Cooperation

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An important Role of Bamboo Winding Composites in
Social Development and South-South Cooperation

竹缠绕复合材料简介

Introduction of Bamboo Winding Composites



竹缠绕复合材料

Bamboo Winding Composites

定义

- 以竹材为基材，以树脂为胶黏剂，采用缠绕工艺加工成型新型生物基材料。

原理

- 充分发挥竹子轴向拉伸强度高的特性，在产品结构中形成无应力缺陷分布。

特点

- 原材料可再生、节能减排、固碳储碳、质轻高强、成本低。

产品

- 可用于制造压力管道、管廊、容器、大型储罐、房屋、运输工具壳体（高铁车厢、飞机机身、船只）、军工装备等产品。

Definition

- A new bio-based material shaped by winding process technology, using bamboo as base material and resin as adhesive.

Principle

- Make fully use of bamboo's great axial tensile strength to form unstressed defect distribution in the product structure.

Characteristics

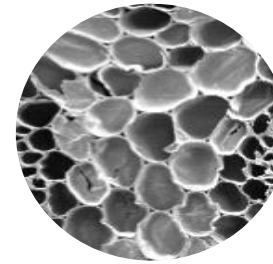
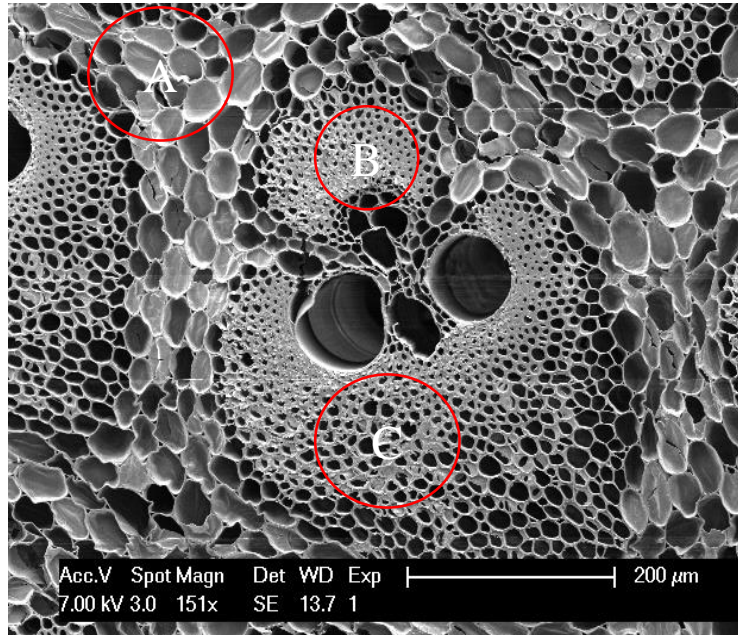
- Raw material renewable, energy saving and carbon emission reduction, carbon sequestration and storage, light weight and high strength, low cost.

Products

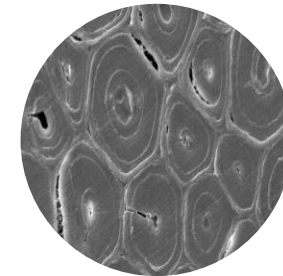
- It can be used to produce pressure pipe, utility tunnel, containers, large storage tank, house, conveyance shell (high speed train coach, aircraft fuselage, ship), military equipment, etc.

竹材强度来自于超大的比表面积
The strength of bamboo material comes from its large specific surface area

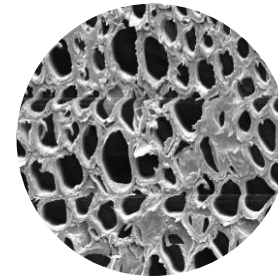
竹维管束横截面 Bamboo fiber pipe bundle cross section



A 薄壁细胞
Parenchyma cell

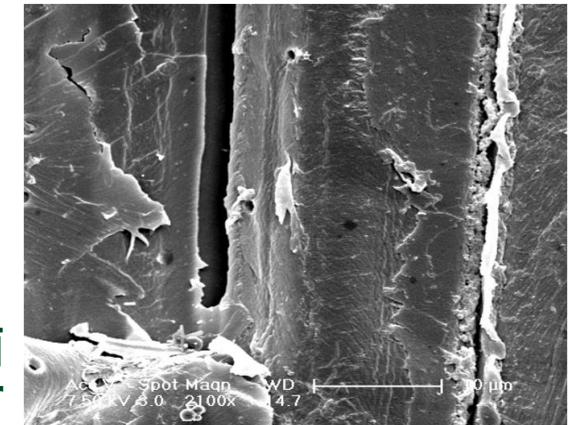


B 竹纤维
Bamboo fiber



C 纤维帽
Fibrous cap

竹纤维的纵剖面 Longitudinal section of bamboo fiber



竹缠绕复合材料应用

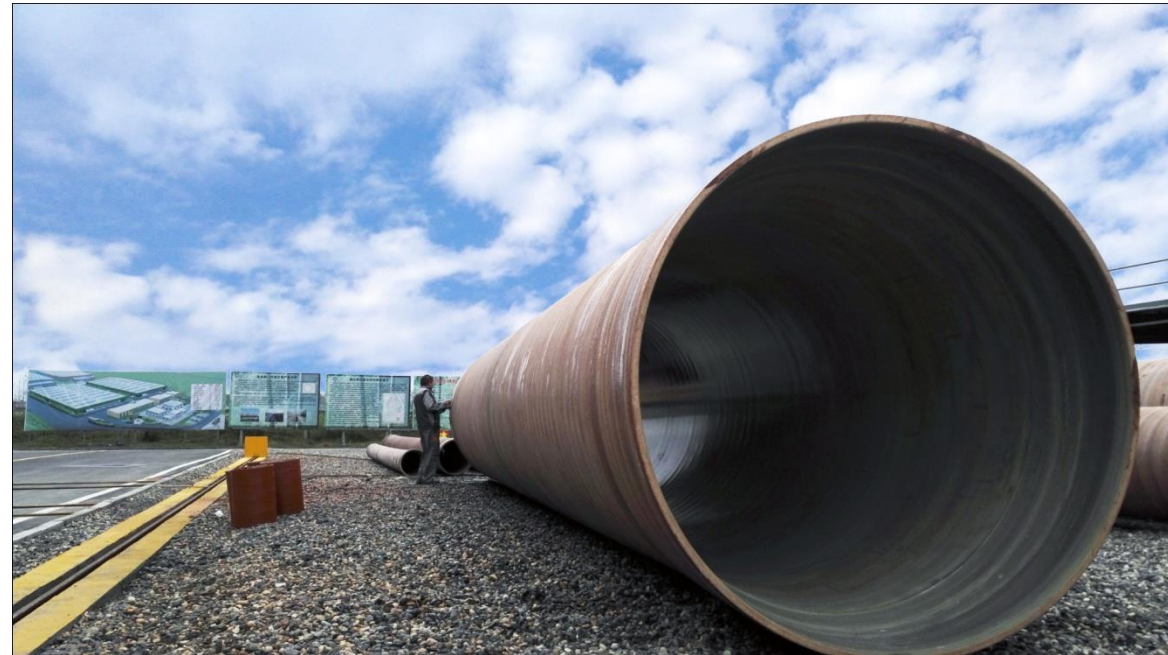
Application of Bamboo Winding Composites



竹缠绕复合管

Bamboo Winding Composite Pipe (BWCP)

- ◉ 世界第一根可工业化生产的生物基管道;
 - ◉ 中国唯一原创性管道。
- ◉ World' s first industrialized bio-based pipe.
 - ◉ Only originally invented bio-based pipe in China.



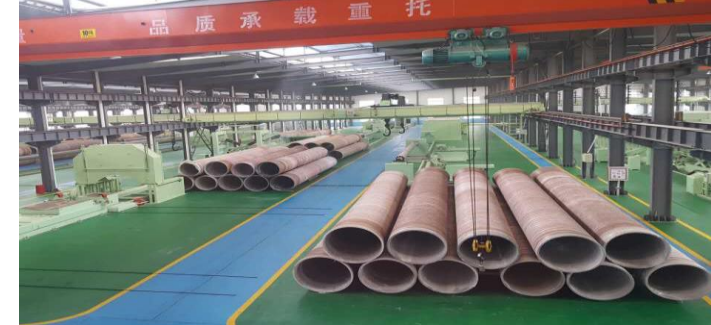
竹缠绕复合管优势 Advantages of BWCP

- 承压能力强
 - 保温性能突出
 - 抗震抗沉降能力强
 - 使用寿命长
 - 节能低碳
 - 重量轻、综合造价低
- ◉ Great pressure resistance
 - ◉ Outstanding thermal insulation
 - ◉ Strong resistance to seismic and subsidence movement
 - ◉ Long service life
 - ◉ Energy saving and low carbon
 - ◉ Light weight and low comprehensive cost

竹缠绕复合管生产

Production of Bamboo Winding Composite Pipe

BARC 2018
世界竹藤大会
Global Bamboo and Rattan Congress



工程安装 Engineering Installation



新疆
Xinjiang Uygur
Autonomous Region



黑龙江
Heilongjiang Province



浙江
Zhejiang Province



湖北
Hubei Province



山东
Shandong Province



内蒙古
Inner Mongolia



竹缠绕城市综合管廊

Bamboo Winding Urban Utility Tunnel

- ◎ 颠覆传统钢筋混凝土管廊材料，使产品更趋科学。
 - ◎ 企业标准经中国住建部审核已经备案。
-
- ◎ Overturn the traditional utility tunnel material of steel reinforced concrete and make the product more scientific.
 - ◎ It's enterprise standard has been recorded after censored by MOHURD in China.



产品优势

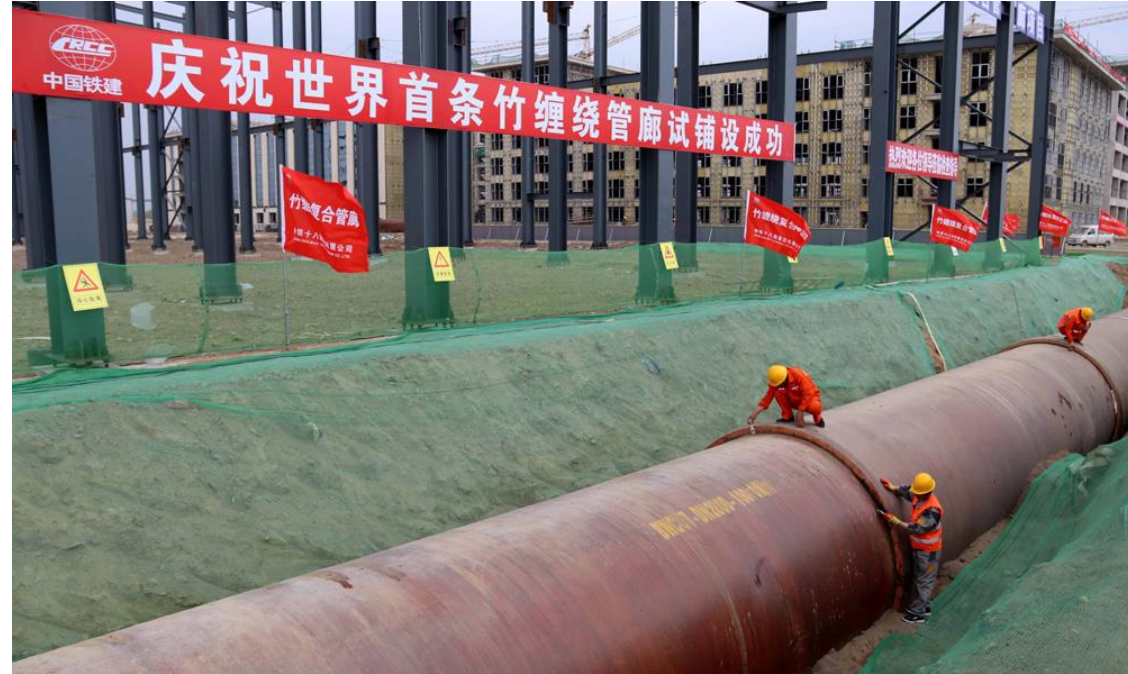
Product Advantages



- 资源可再生
 - 节能低碳
 - 防火耐水
 - 抗震抗沉降能力强
 - 初始力学性能好，稳定性高
 - 综合造价低（较目前钢筋水泥管廊低20%以上）
 - 施工安装方便
- Resource renewable
 - Energy saving and low carbon
 - Fire proof and water resistant
 - Strong resistance to seismic and subsidence movement
 - Good initial mechanical performance and high stability
 - Low comprehensive cost (20% lower than current steel reinforced concrete)
 - Easy for construction and installation

工程安装 Engineering Installation

- 世界首条竹缠绕城市综合管廊在内蒙古自治区呼和浩特市铺设成功（2018-4-24）。
- World's first Bamboo Winding Urban Utility Tunnel has been successfully built in Huhhot City, Inner Mongolia Autonomous Region (April 24, 2018).



竹缠绕整体组合式房屋

Bamboo Winding Modular Assembled House

- ◉ 世界上第一款植物缠绕整体组合式房屋。
 - ◉ 2017年10月试制成功。
- ◉ World' s first plant winding modular assembled house.
 - ◉ In October 2017, bamboo winding modular assembled house was successfully produced.



室内布置 Room Layout



餐厅 Dining Room



客厅 Living Room



书房 Study Room



主卧室 Owner Bedroom



老人房 Elder Room



儿童房 Children Room

建造流程

Construction Process

- 以每间房屋为单位在工厂中进行整体缠绕成型、装修、放置家具；
 - 每间房屋整体运输；
 - 现场进行组装（200m²的二层房屋组装时间只需要2~4小时）。
- Each room is shaped by winding process technology and decorated, and furniture is placed in the manufactory;
 - Each room is transported to the construction site.
 - Each room is assembled together into a house at construction site (only 2~4 h assembly time for 200 m² house).



主体缠绕
Main Body Winding



房屋起吊
House Lifting UP



房屋运输
House Transport



房屋组装
House Construction



光伏安装
PV Panel Installation

竹缠绕整体式单身公寓 Bamboo Winding Single Apartment



外观 Appearance



室内场景 Indoor scene



厨房 Kitchen



卫生间 Bathroom



床铺 Bed



电视 Television

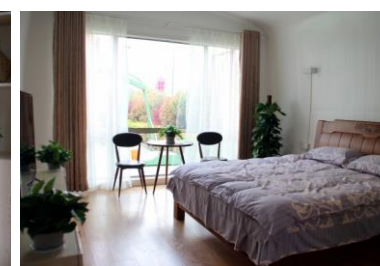


书桌 Writing Desk



竹缠绕整体组合式农舍 Bamboo Winding Modular Assembled Farmhouse

BARC 2018
世界竹藤大会
Global Bamboo and Rattan Congress



竹缠绕整体式厕所 Bamboo Winding Public Toilet



竹缠绕车厢 Bamboo Winding Train Coach

- 正在对车厢性能进行全面测试阶段。
- 具有环保、质轻、抗震、保温、隔音、防火等优势。
- 极大地提高了在极端情况下的安全性能。

- The train coach performance tests are being conducted.
- It has many advantages of environmentally friendly, light weight, seismic resistance, thermal insulation, sound insulation and fire proof performance, and so on.
- Greatly improve the safety performance under extreme situation.



在社会发展及南南合作将发挥重要作用

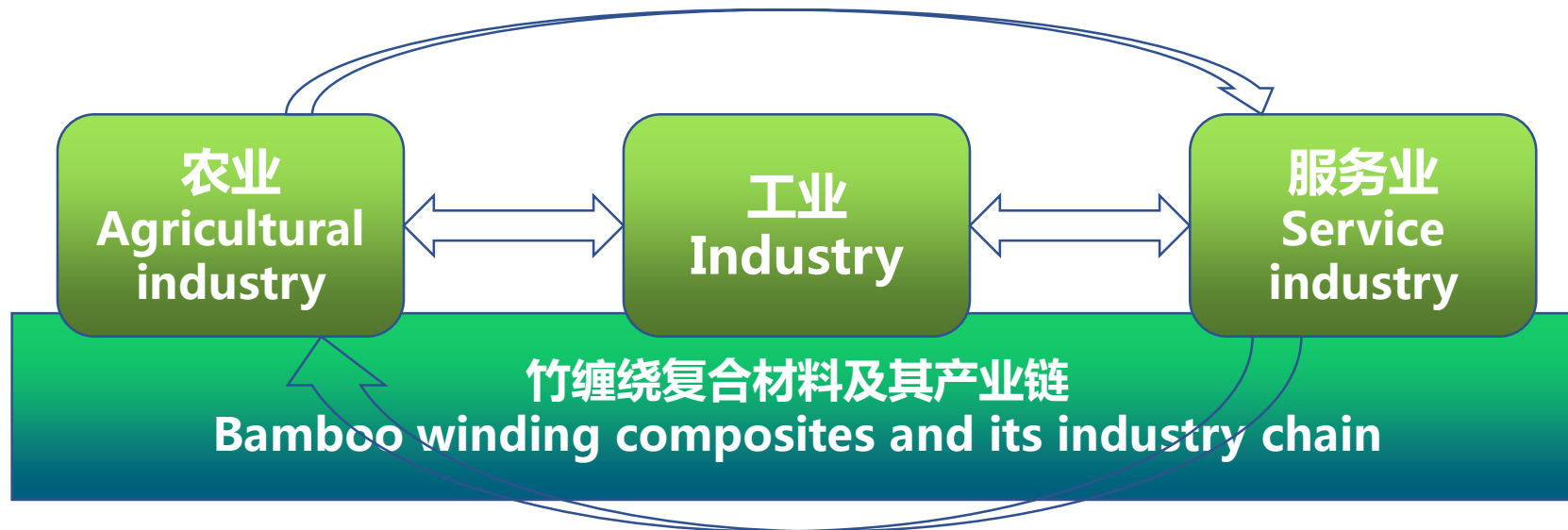
Bamboo winding technology will play an important role in social development and South-South cooperation

社会发展 Social Development

- ◎ 造就一个新产业 Creating a new industry

竹缠绕复合材料产业链贯穿国民经济一、二、三产业，促进产业联动，将造就一个万亿级的绿色材料产业。

Industry chain of bamboo winding composites run through the agricultural industry, industry, and Service industry, promote industrial linkage, and will create a trillion-level green material industry.



社会发展 Social Development

节能减碳 Energy saving and carbon emission reduction

全球竹林面积3200万公顷
World's bamboo area 32
million hm²



4亿吨竹资源
400 million tons
Bamboo resource
in the world



1.5亿吨竹缠绕材料产品
150 million tons BWCP

↓
Coal



节能超过4亿吨标准煤
>400 million tons of standard coal

↓
CO₂



10亿吨二氧化碳排放量
>1 billion tons CO₂ emission

社会发展 Social Development

提高农村经济收益 Increasing rural economic benefit

带动**8000万**农户
户均增收**600美元**
Benefit 80 million rural households by bringing an average annual income of \$600.

- 4亿吨
 - 400 million tons
- 竹资源
Bamboo resources

按人均年收入**4500美元**计，解决**900万**农村劳动力就业
9 million new jobs created with an average per capita income of around \$4,500.

- 6,000万吨
 - 60 million tons
- 竹材
Bamboo material

提供就业岗位**145万**人均年收入**9000美元**
Provide 1.45 million jobs with per capita annual income of about \$9,000.

- 15,000万吨
 - 150 million tons
- 竹缠绕制品
Bamboo winding composites products

南南合作

South-South Cooperation

- 通过输出技术和装备，利用当地的竹资源、劳动力，生产当地需要的竹缠绕制品，增加就业岗位，增加出口创汇，提高经济收入。同时节能减排，应对气候变化。
- By exporting the technology and equipments, bamboo winding composites technology can use the local bamboo resources and labor force, produce the bamboo winding composites of local need, thereby leading to increase employee, increase foreign exchange-earning, and increase economic income. Meanwhile, bamboo winding composites technology can save energy and reduce carbon emission, and deal with climate changes.

南南合作 South-South Cooperation

技术推广 Technology Extension



一带一路推动竹藤发展，北京
Development of Bamboo and Rattan for Belt and Road, Beijing



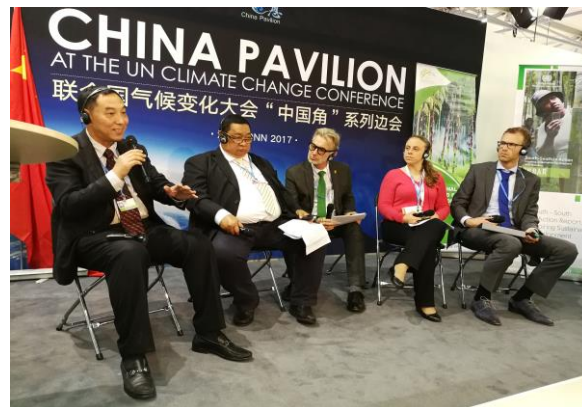
生态文明贵阳国际论坛，贵州
International Forum on Ecological Civilization in Guiyang, Guizhou



中菲竹材利用创新技术对话会，菲律宾
China-Philippines Innovation Technology Dialogue of Bamboo Utilization, Philippines



全球科技创新大会，布鲁塞尔
2017 G-STIC, Brussels



世界应对气候大会，波恩
World Climate Conference, Bonn



受邀访问合作，尼泊尔
Invited Visit Cooperation, Nepal

南南合作 South-South Cooperation

学习交流 Study and exchanging activities



第四期气候变化南南合作培训班 (2016.10.23)
4th S-S Cooperation Training Course 2016 on
Climate Change



2017年发展中国家竹产业科技创新与标准化研修班 (2017.5.19) Seminar on
Scientific and Technological Innovation Capacity and Standardization
of Bamboo Industry for Developing Countries 2017



2017年中非共和国竹产品开发技术培训班 (2017.7.26)
Séminaire sino-centrafricain sur la Technique
d' Exploitation des Produits de Bambou 2017



2017年厄瓜多尔灾后重建竹资源创新利用培训班 (2017.8.14)
Seminario de Utilización Innovadora de Recursos del Bambú en
Reconstrucción Post-sismo para Ecuador 2017



2017年“一带一路”国家竹藤资源可持续开发与利用研修班 (2017.10.20)
Seminar on Sustainable Development and Management of Bamboo
and Rattan Resources for "the Belt and Road" Countries 2017



2017竹藤产业可持续发展与南南合作高级别政策研讨班 (2017.11.9)
High-level Workshop on Policy Approach of Bamboo and Rattan
in Sustainable Development and S-S Cooperation 2017

- 一年多来，有四十多个发展中国家的近300名代表，包括12个国家的12位部级以上官员，来公司考察学习
During more than a year, nearly 300 representatives from more than 40 developing countries, including 12 the ministerial officials from 12 countries, have come to visit the Xinzhou company

结束语 Conclusion

竹缠绕复合材料将成为继钢材、水泥、金属、塑料、木材等基础性材料后的一种新型生物基复合材料。竹缠绕复合材料及其技术的推广应用，将为人类的可持续发展、为地球的绿水青山作出巨大贡献！

Bamboo Winding Composites will become a new biological composite material after steel, cement, metal, plastic, timber, etc. The promotion and application of Bamboo Winding Composites and its technology will make great contributions to mankind' s sustainable development and earth' s lucid waters and lush mountains .

THANKS

