

# United Nations Conference on Trade and Development

**13th Multi-Year Expert Meeting on Commodities and Development**

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**Bamboo: Experience from China**

By

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The views expressed are those of the author and do not necessarily reflect the views of UNCTAD.



# 四十年来中国竹产业发展主要实践和经验 Experiences of China's bamboo industry development in the past 40 years

方长华  
Changhua FANG  
Oct. 12 2022



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2001-2010: The rising stage of bamboo industry

➤ 竹产业融合发展阶段(2010-至今)

From 2010: Integrated development of bamboo industry





## 一、资源粗放经营和传统加工阶段(1978-2000年)

### 1978-2000: Extensive management of bamboo resource and traditional processing

#### 1、竹资源培育Bamboo resource cultivation

- 1970年代林分结构自然更新 1970s: Wild extensive management





# 一、资源粗放经营和传统加工阶段(1978-2000年)

## 1978-2000: Extensive management of bamboo resource and traditional processing

### 1、竹资源培育Bamboo resource cultivation

#### ➤ 1980年代半集约经营1980s: Half-extensive management



- **竹林林分结构调控:**为了维持每年竹林的持续均衡生产,要实行合理砍伐、合理留养、每年施肥等措施。Rational management of bamboo forest stand structure to maintain the continuous and balanced production
- **尝试覆盖栽培:**在竹林地面覆盖一些材料(地膜覆盖栽培或有机材料),利用微生物繁殖、分解、发酵时产生的热量进行增温,从而提高土壤温度,促进笋芽分化生长,达到提早收获竹笋。Mulching cultivation with film or organic materials to improve bamboo and bamboo shoots production

# 一、资源粗放经营和传统加工阶段(1978-2000年)

## 1978-2000: Extensive management of bamboo resource and traditional processing

### 1、竹资源培育Bamboo resource cultivation

#### ➤ 1990年代定向培育和混交经营

#### 1990s: Orientation Cultivation & Mixed bamboo forest management



- **竹林定向培育:**材用竹林、笋用竹林、纸浆用竹林、观赏用竹林

Orientation Cultivation: bamboo materials, bamboo shoots, bamboo pulp, landscape bamboo

- **混交经营:** 和树木混交栽培

Bamboo forest mixed with trees



## 一、资源粗放经营和传统加工阶段(1978-2000年)

### 1978-2000: Extensive management of bamboo resource and traditional processing

#### 2、竹材加工Bamboo materials processing

- 1980年代以前：竹材加工主要依靠手工，用途是圆竹家具、农具、编织工艺品及生活用品，产业链单一，工业化程度低，附加值低

Before 1980s: Bamboo processing mainly depended on handwork. Used for bamboo furniture, farm tools, woven handicrafts and daily necessities, with low degree of industrialization and low added value



# 一、资源粗放经营和传统加工阶段(1978-2000年)

## 1978-2000: Extensive management of bamboo resource and traditional processing

### 2、竹材加工Bamboo materials processing

- 1980年代：开发了竹片胶合板、竹编胶合板、竹帘胶合板、竹刨花板等生产技术，产品应用于汽车车厢底板、水泥模板等，开创了竹材工业化利用的先河。 1980s: bamboo strips plywood, bamboo woven plywood, bamboo curtain plywood, bamboo oriented strand board were developed, and the products were applied to vehicle flooring, cement formwork, etc., promoting the industrial utilization of bamboo material.





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1978-2000: Extensive management of bamboo resource and traditional processing

### 2、竹材加工Bamboo materials processing

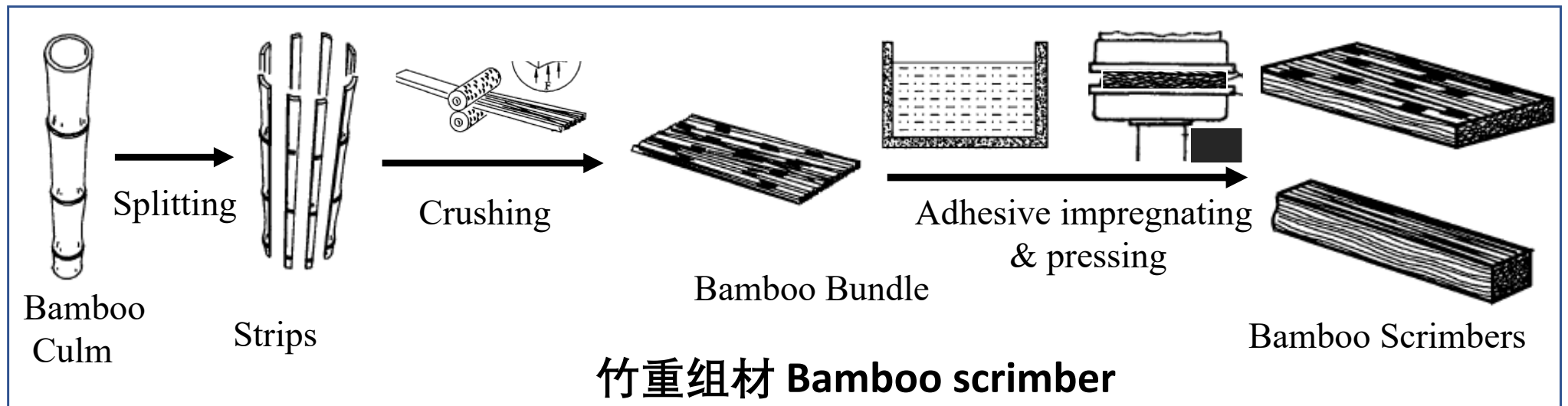
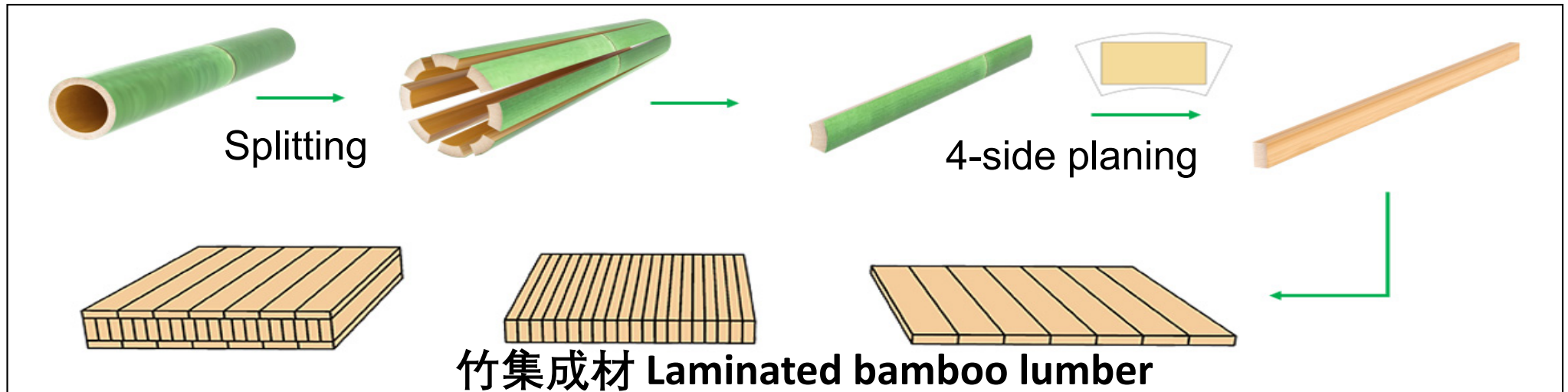
- 1990年代：竹集成材(竹片胶合材)、竹重组材、竹木复合材等材料得到开发和进一步升级，应用于竹地板、竹家具等。 1990s: laminated bamboo lumber, bamboo scrimber, bamboo-wood composite were developed and further upgraded, and applied to bamboo floorings, bamboo furniture, etc.



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### 2、竹材加工Bamboo materials processing

- 1990年代：由手工和半机械化生产向机械化生产，由单一产品向系列产品全面发展的产业转型，并形成了具有一定规模和经济效益的竹材加工工业体系，为竹产业的高速发展奠定了基础。1990s: The transformation from manual and semi mechanized production to mechanized production has been realized. A series of bamboo products have been developed, and a bamboo processing industrial system with a certain scale and economic benefits has been formed, laying a foundation for the rapid development of the bamboo industry.
- 1978-2000年，竹材加工行业整体工业化程度低，产业链不完善，产品附加值低，竹材利用率低，加工剩余物没得到合理利用。From 1978 to 2000, the overall industrialization of bamboo processing was low with short industrial chain, low products added value, low utilization rate of bamboo materials, and without rational utilization of processing.
- 2000年全国竹产业产值仅有170亿元人民币（20.5亿美元）。In 2000, the output value of the national bamboo industry was only 17 billion RMB(\$ 2.05 billion USD).

## 二、加工产业兴起阶段(2001-2010年)

### 2001-2010: The rising stage of bamboo industry

#### 1、竹资源培育Bamboo resource cultivation

##### ➤ 多目标经营，提高竹林综合效益

##### Multi-objective management to improve the comprehensive benefit of bamboo forests

- 构建了经济效益和生态效益兼顾的高产低耗竹林培育技术体系

The cultivation technology system of high-yield and low consumption bamboo forest with both economic and ecological benefits has been developed

- 科学定位竹林经营目标、合理调整竹林结构、优化组合经营措施，建立了基于竹子生长发育规律的季节施肥和根际肥培技术,明确了竹子最佳施肥年龄、施肥季节和施肥方式

Scientifically determine the bamboo forest management objectives, rationally adjust the bamboo forest structure, optimize the combination of different management measures, and establish a seasonal fertilization and rhizosphere fertilizer technology based on bamboo growth pattern



## 二、加工产业兴起阶段(2001-2010年)

### 2001-2010: The rising stage of bamboo industry

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##### ➤ 竹林健康经营技术Healthy management technology of bamboo forest

- 研究了竹林生产力与立地条件、林分结构、抚育措施等相协调的竹林健康经营技术Healthy management techniques for bamboo forests that coordinate the productivity of bamboo forests with site conditions, forest structure and tending measures
- 开展了竹林害虫行为调控、生物以及化学防治新技术研究New technologies of behavior regulation, biological and chemical control of bamboo pests



竹子病虫害系统调查Investigation of bamboo diseases and pests



病虫害生物信息获取 pest information collection



数字化网络平台构建 Digital network platform

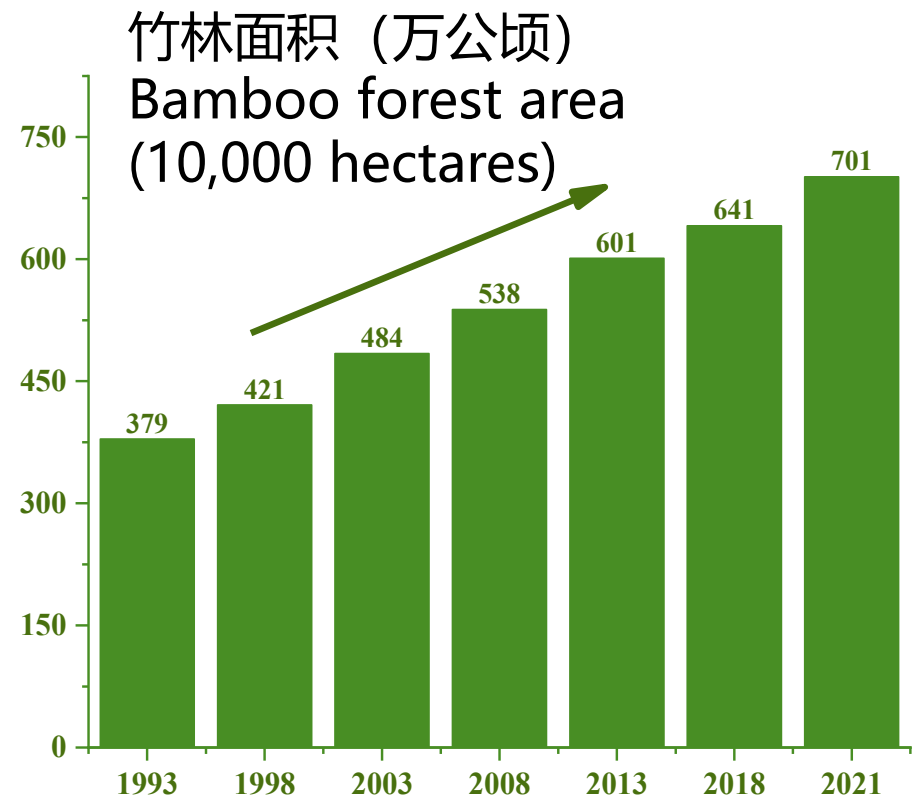
## 二、加工产业兴起阶段(2001-2010年)

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➤ 规模培植, 丰富竹种, 竹林资源进一步扩大

Large scale cultivation, enrichment of bamboo species, further expansion of bamboo forest resources





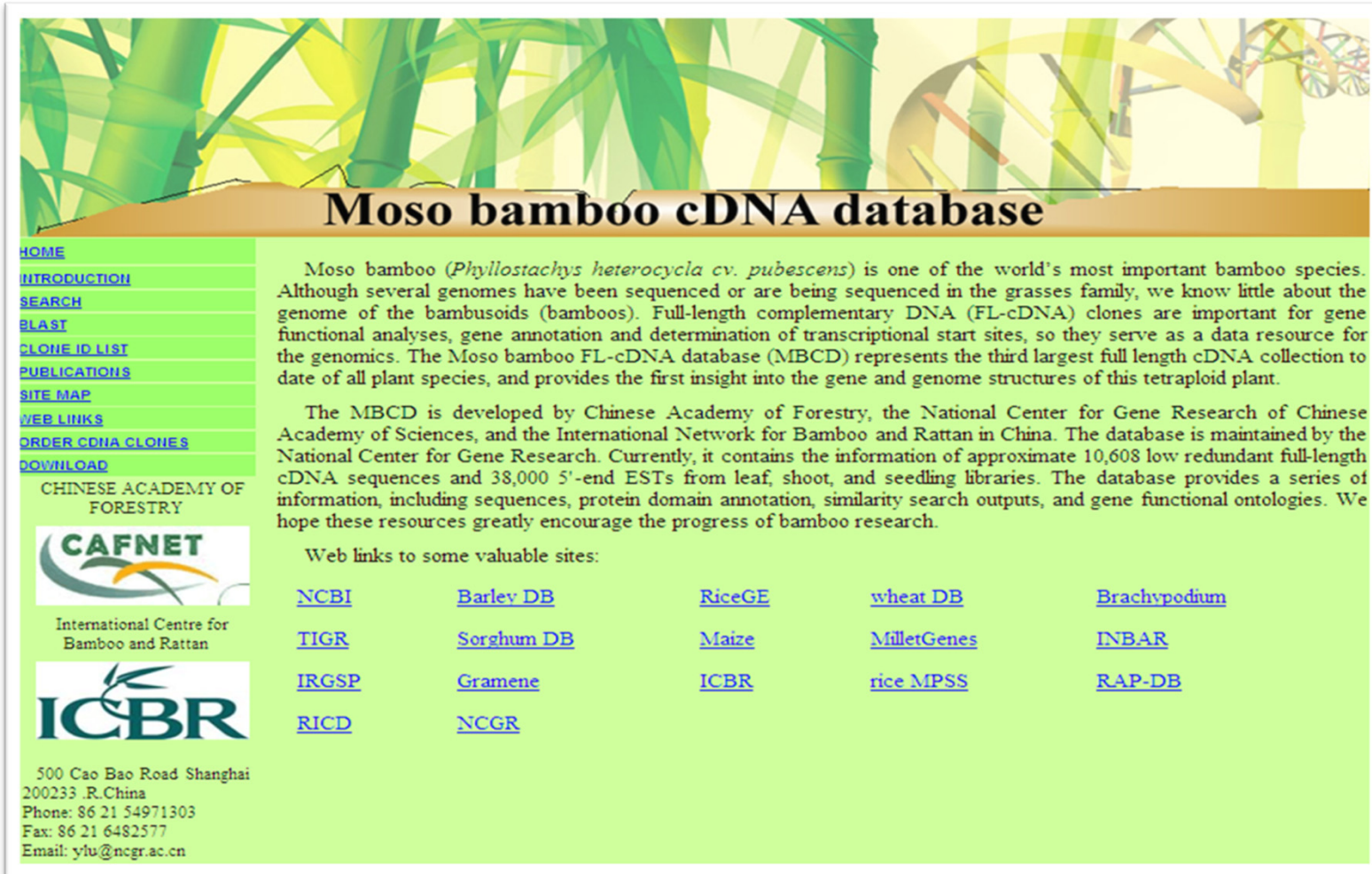
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##### ➤ 建立首个竹类植物cDNA数据库

##### Establishment of the first bamboo cDNA database



**Moso bamboo cDNA database**

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[SEARCH](#)  
[BLAST](#)  
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Email: ylu@negr.ac.cn

Moso bamboo (*Phyllostachys heterocycla cv. pubescens*) is one of the world's most important bamboo species. Although several genomes have been sequenced or are being sequenced in the grasses family, we know little about the genome of the bambusoids (bamboos). Full-length complementary DNA (FL-cDNA) clones are important for gene functional analyses, gene annotation and determination of transcriptional start sites, so they serve as a data resource for the genomics. The Moso bamboo FL-cDNA database (MBCD) represents the third largest full length cDNA collection to date of all plant species, and provides the first insight into the gene and genome structures of this tetraploid plant.

The MBCD is developed by Chinese Academy of Forestry, the National Center for Gene Research of Chinese Academy of Sciences, and the International Network for Bamboo and Rattan in China. The database is maintained by the National Center for Gene Research. Currently, it contains the information of approximate 10,608 low redundant full-length cDNA sequences and 38,000 5'-end ESTs from leaf, shoot, and seedling libraries. The database provides a series of information, including sequences, protein domain annotation, similarity search outputs, and gene functional ontologies. We hope these resources greatly encourage the progress of bamboo research.

Web links to some valuable sites:

<a href="#">NCBI</a>	<a href="#">Barley DB</a>	<a href="#">RiceGE</a>	<a href="#">wheat DB</a>	<a href="#">Brachypodium</a>
<a href="#">TIGR</a>	<a href="#">Sorghum DB</a>	<a href="#">Maize</a>	<a href="#">MilletGenes</a>	<a href="#">INBAR</a>
<a href="#">IRGSP</a>	<a href="#">Gramene</a>	<a href="#">ICBR</a>	<a href="#">rice MPSS</a>	<a href="#">RAP-DB</a>
<a href="#">RICD</a>	<a href="#">NCGR</a>			



## 二、加工产业兴起阶段(2001-2010年)

### 2001-2010: The rising stage of bamboo industry

#### 2、竹子加工利用 Bamboo processing and utilization

- 竹材加工及综合利用取得较大进展, 新技术、新设备, 实现规模化制造  
Great progress has been made in processing and comprehensive utilization. New technologies and equipment have been developed to achieve large-scale manufacturing



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- 竹集成材和竹重组材得到进一步发展和应用 Laminated bamboo lumber and Bamboo scrimber had been further developed and applied to floorings, furniture, etc.





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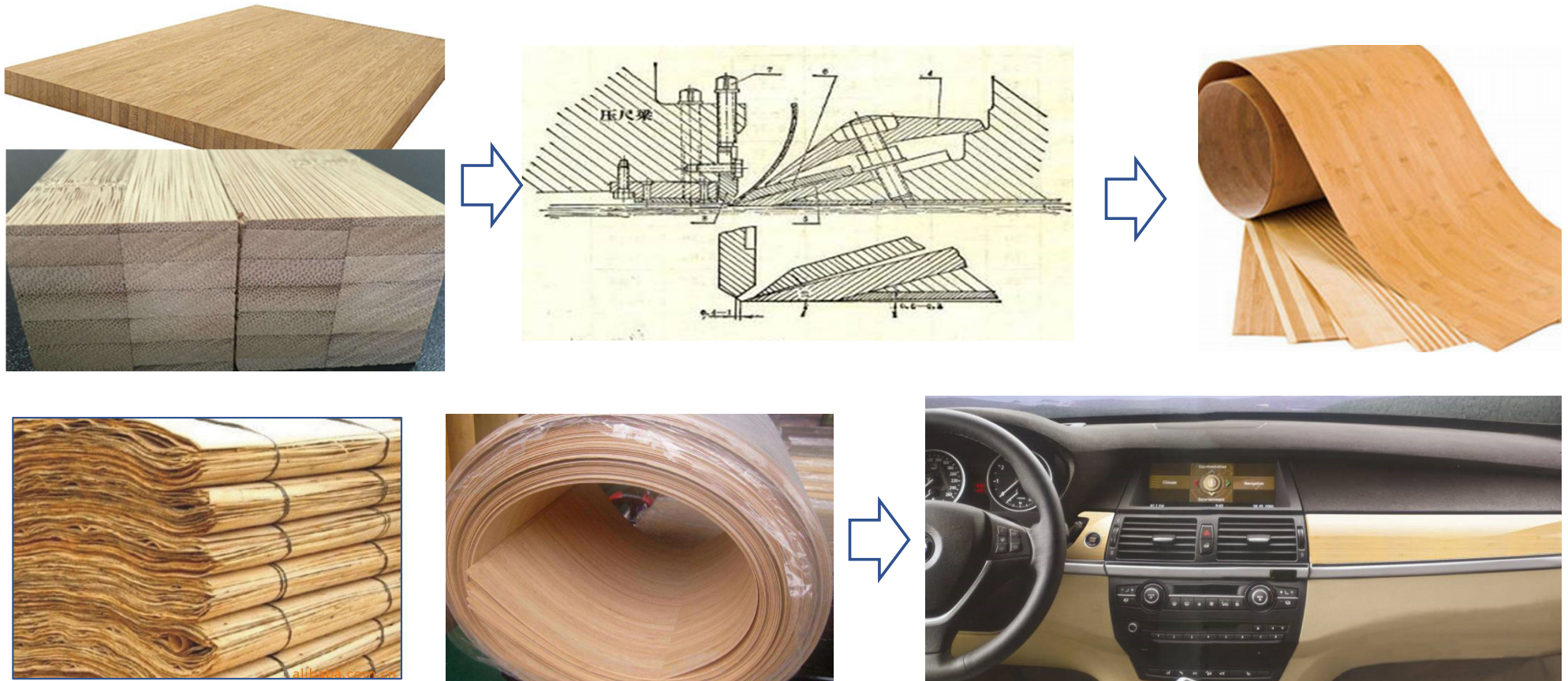


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- 高附加值产品得到开发 High value-added products were developed



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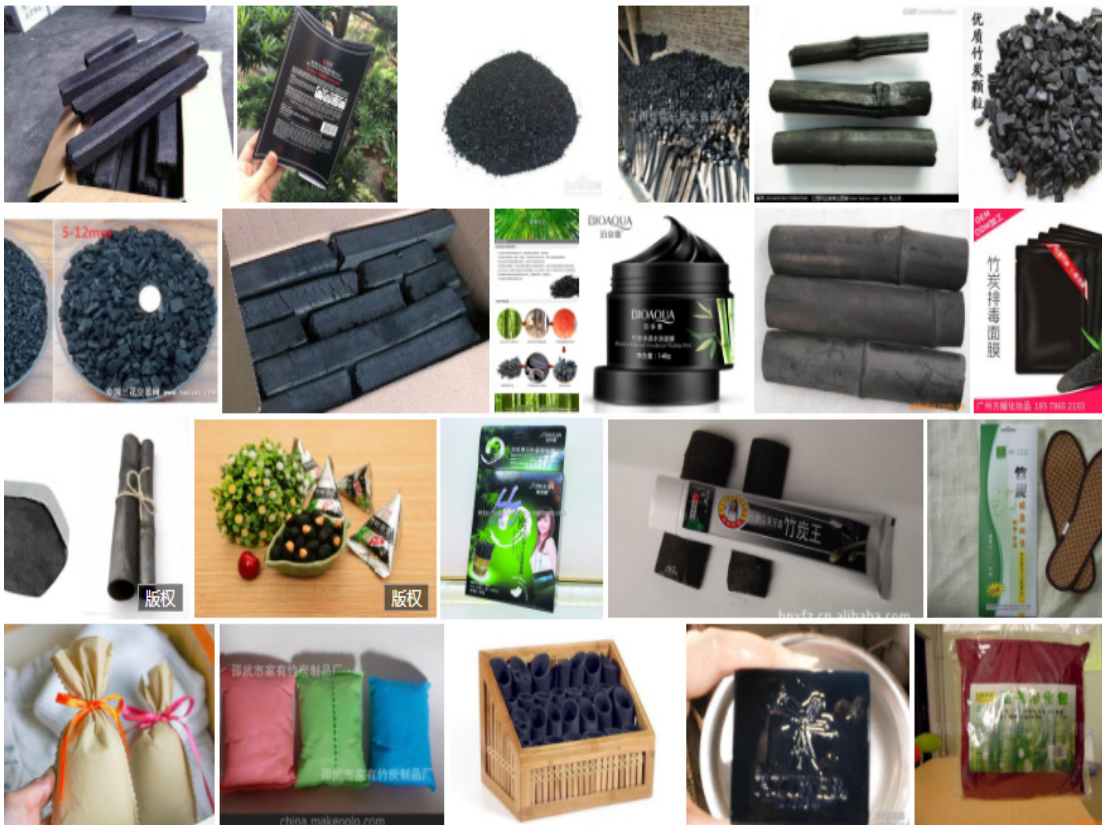


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#### 2、竹子加工利用 Bamboo processing and utilization

- 竹炭系列产品和竹叶黄酮产品 Development of bamboo charcoal series products and Bamboo leaf Flavone



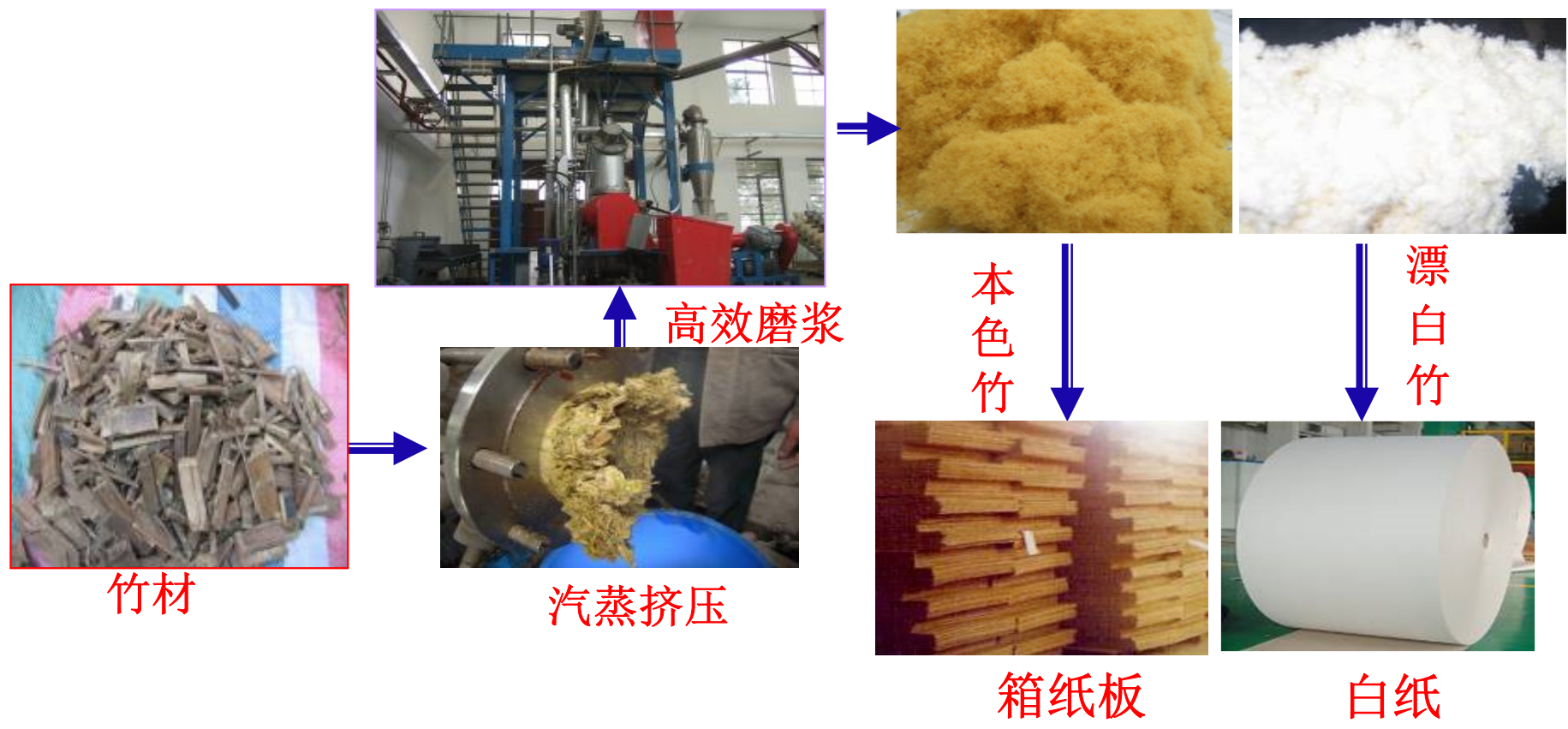


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### 2001-2010: The rising stage of bamboo industry

#### 2、竹子加工利用 Bamboo processing and utilization

##### ➤ 竹纤维制备及竹材制浆造纸 Bamboo Fiber, Pulping and Papermaking



## 二、加工产业兴起阶段(2001-2010年) 2001-2010: The rising stage of bamboo industry

### 3、竹子生态旅游发展势头强劲 Bamboo eco-tourism well developed



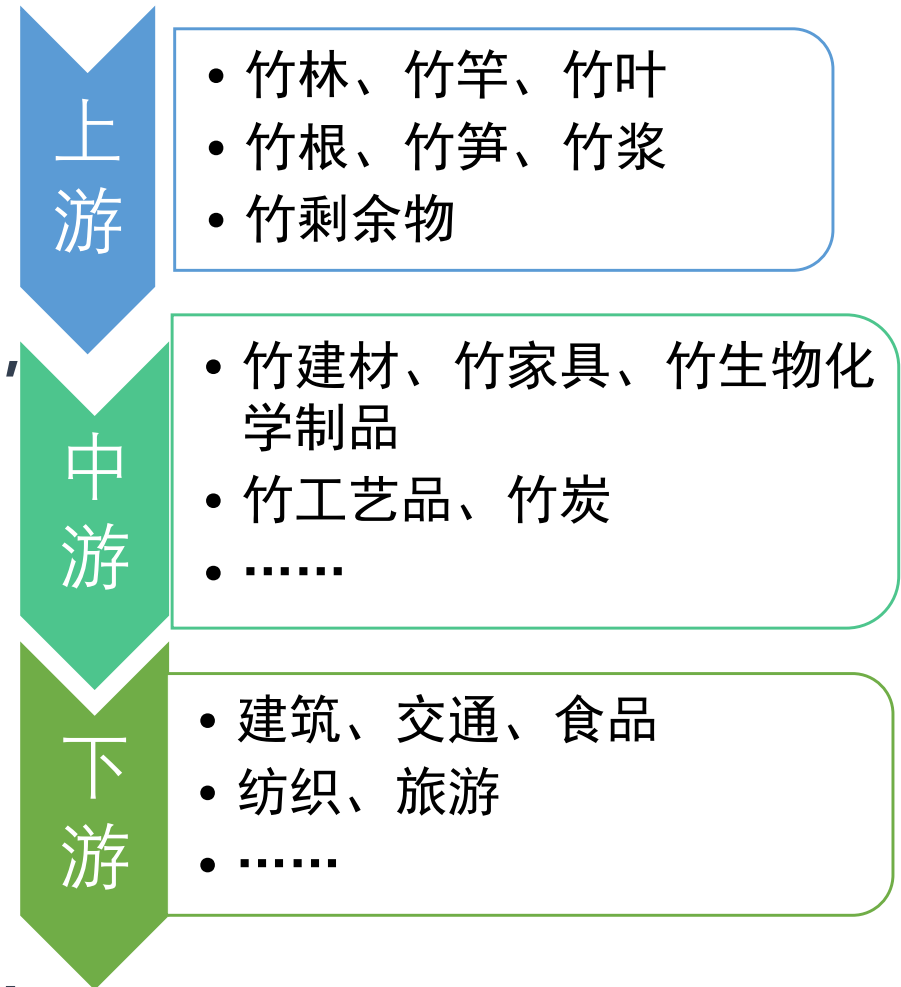
## 二、加工产业兴起阶段(2001-2010年)

### 2001-2010: The rising stage of bamboo industry

4、各地相继重视竹产业发展，各自出台相应政策。Local governments had attached importance to the development of bamboo industry and issued corresponding policies.

5、产业链不断延长，产品附加值不断增加，竹制品逐渐从传统的应用领域向高技术领域扩展，一、二、三产逐步有效融合。

The industrial chain continued to extend, and the added value of products continued to increase. Bamboo products were gradually expanding from traditional application fields to high-tech fields, and the primary, secondary and tertiary industries were gradually and effectively integrated.





## 二、加工产业兴起阶段(2001-2010年)

### 2001-2010: The rising stage of bamboo industry

#### ◆典型竹产业发展案例：浙江安吉县

#### Typical case of bamboo industry development: Anji County, Zhejiang Province



2003年4月9日，习近平同志到安吉视察指出，竹子产业大有可为，希望安吉在这方面能够做得更好，将竹子利用做成一篇大文章，在全国起一个示范作用。

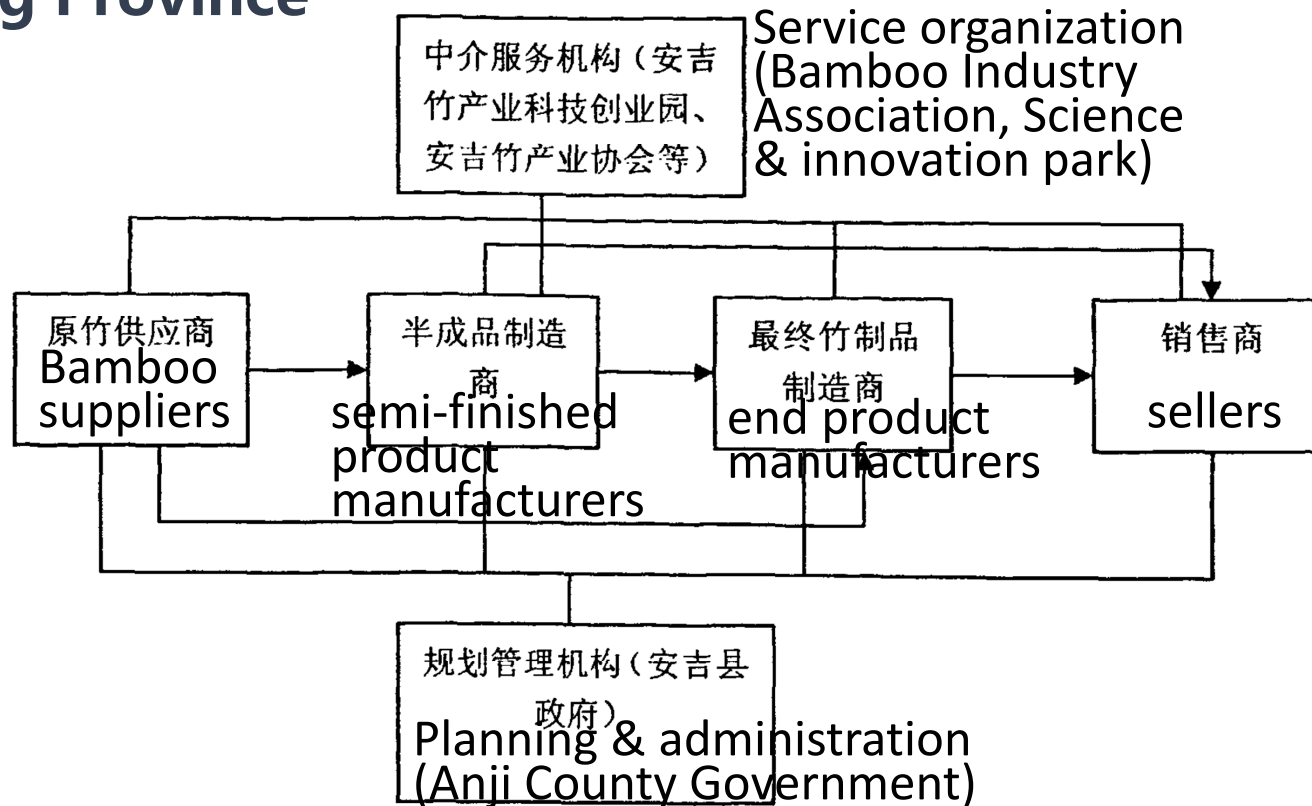
On April 9, 2003, XI Jinping visited Anji and pointed out that the bamboo industry has great potential. He hoped Anji could do better in this regard, and make a great article on the use of bamboo to play a demonstration role in the whole country.

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### 2001-2010: The rising stage of bamboo industry

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#### Typical case of bamboo industry development: Anji County, Zhejiang Province



安吉竹加产业集群各环节关系  
Bamboo industrial cluster of Anji

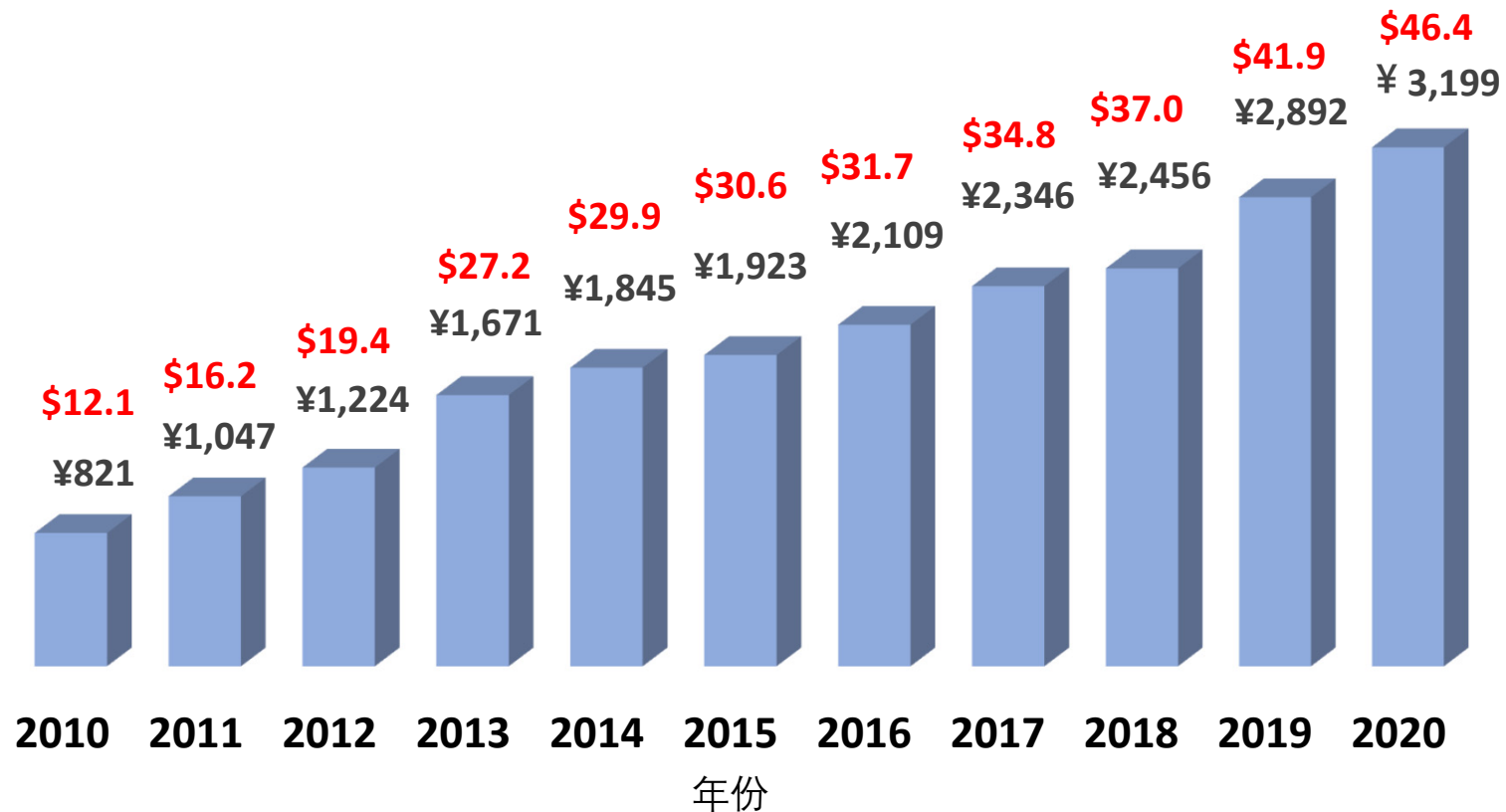
### 三、竹产业融合发展阶段(2010-至今)

## From 2010: Integrated development of bamboo industry

中国竹产业产值 (亿元 100 million RMB)

Output value of China bamboo industry

(Billion USD)



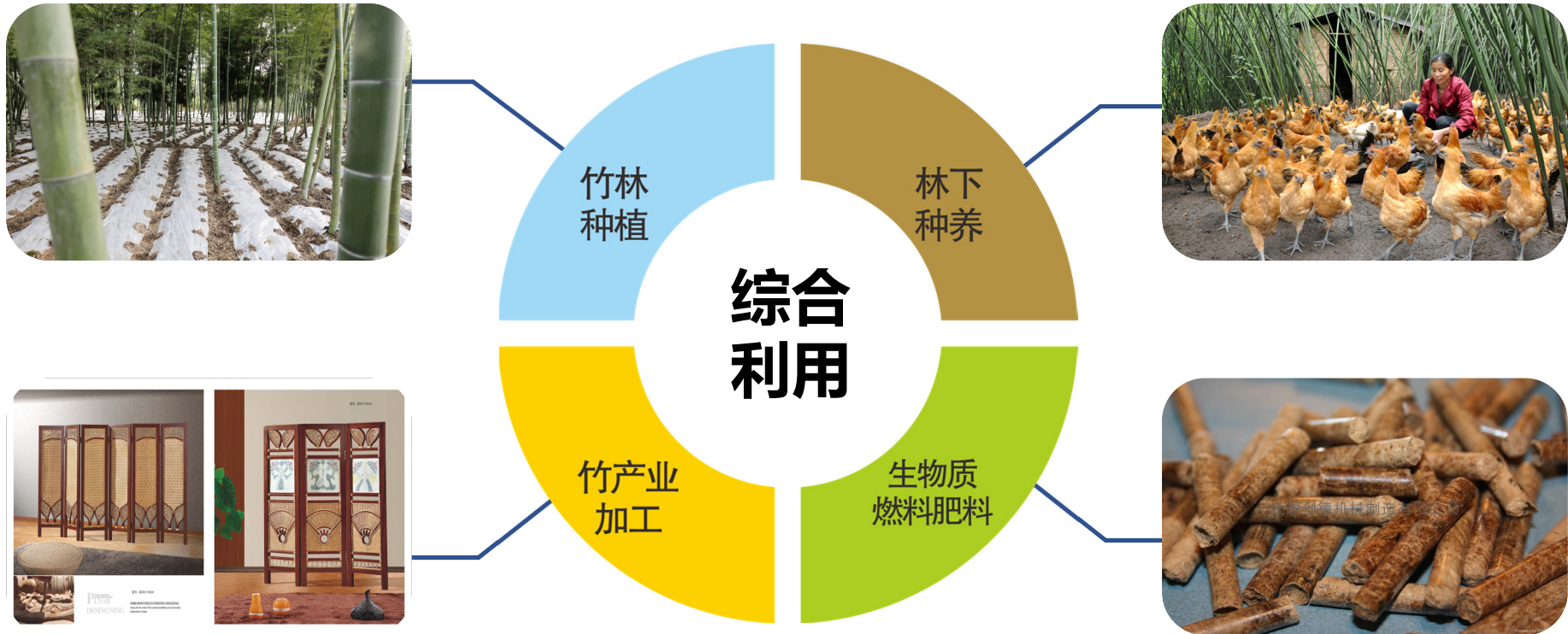


### 三、竹产业融合发展阶段(2010-至今)

## From 2010: Integrated development of bamboo industry

#### ➤ 进一步提升竹子综合利用

The comprehensive utilization of bamboo has been further improved



### 三、竹产业融合发展阶段(2010-至今)

#### From 2010: Integrated development of bamboo industry

- 圆竹在现代建筑和家具上得到更多应用 Round bamboo culms have been more widely used in modern architecture and furniture





四川宜宾国际竹产品交易中心  
International Bamboo  
Products Trading Center,  
Yibin, Sichuan





### 三、竹产业融合发展阶段(2010-至今)

#### From 2010: Integrated development of bamboo industry

- 竹集成材和竹重组材得到进一步提升和更多应用 Laminated bamboo lumber and bamboo scrimber have been further improved and more widely used.









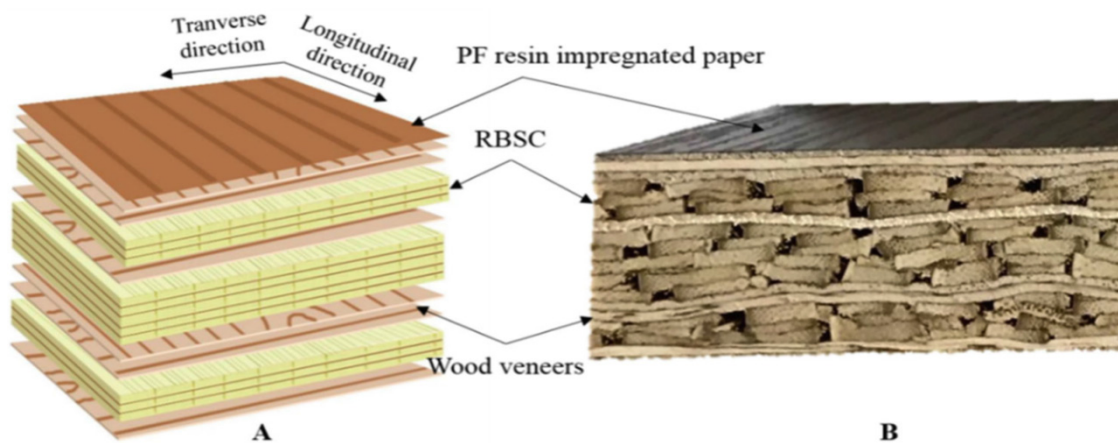
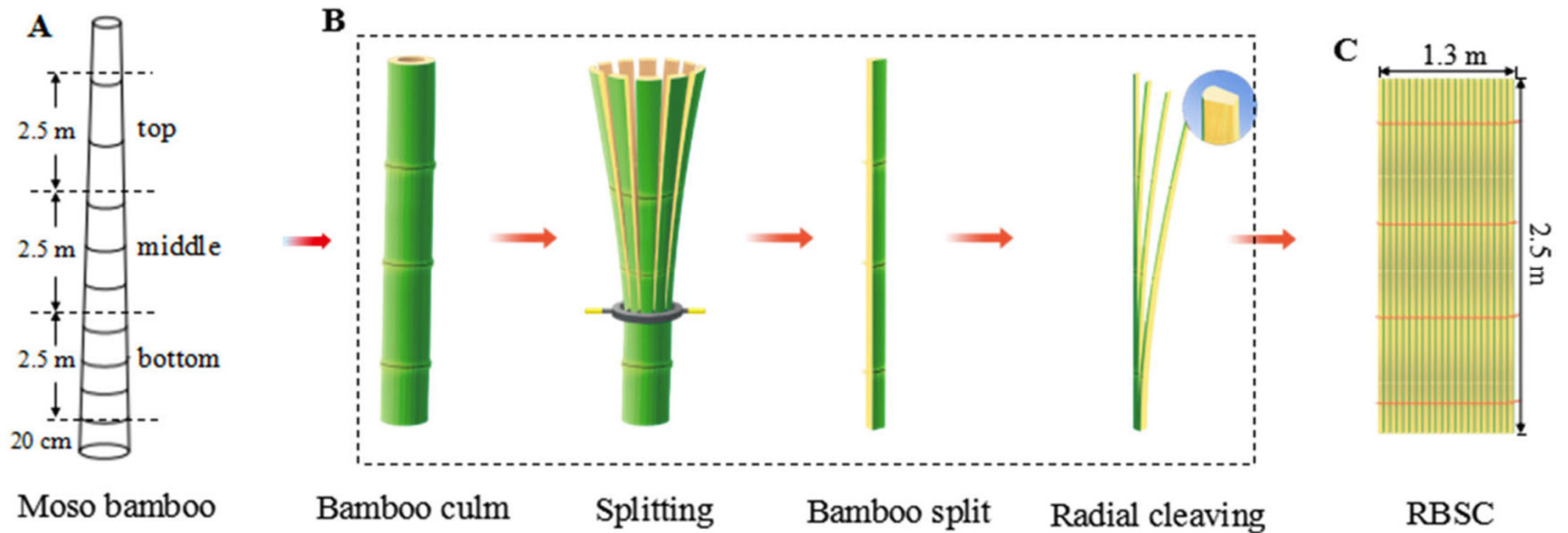




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## From 2010: Integrated development of bamboo industry

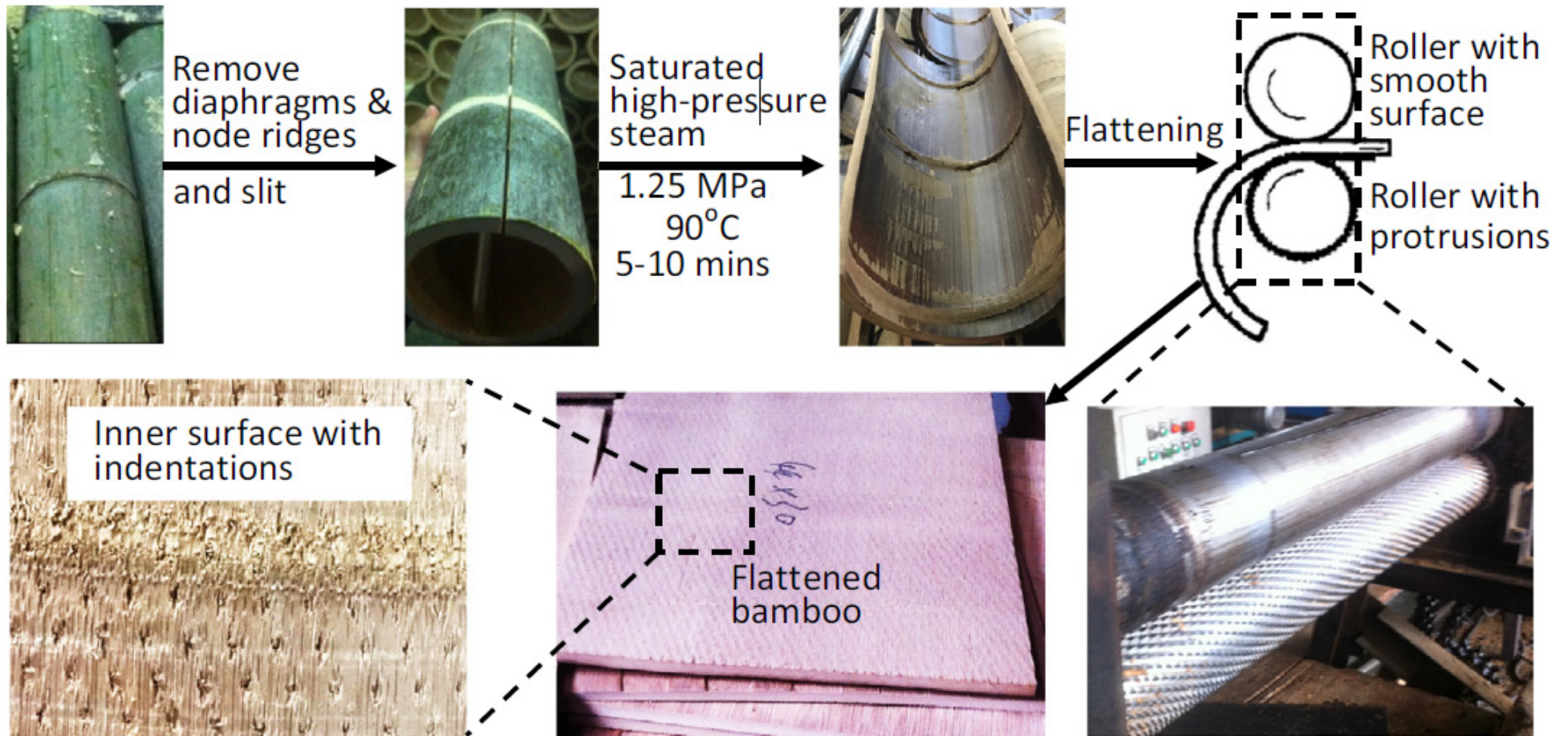
- 新型竹质集装箱底板开发和应用-替代木制 Development and application of novel container flooring (replacing wood)



### 三、竹产业融合发展阶段(2010-至今)

## From 2010: Integrated development of bamboo industry

- 竹展平技术开发和应用 Development and application of bamboo culm flattening technology



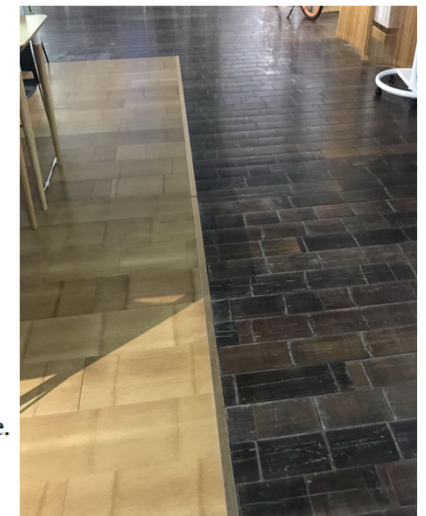
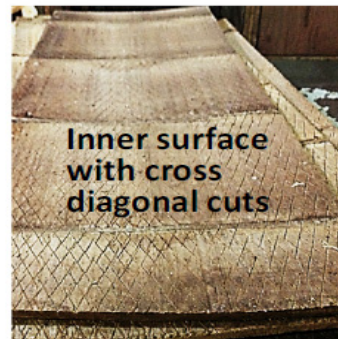
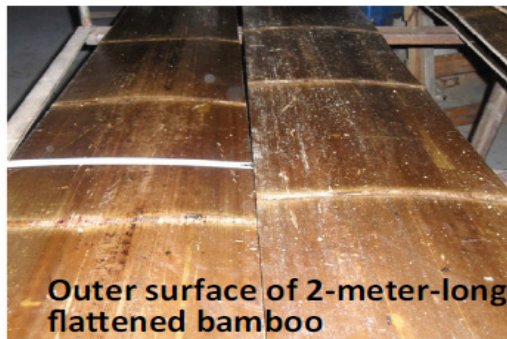
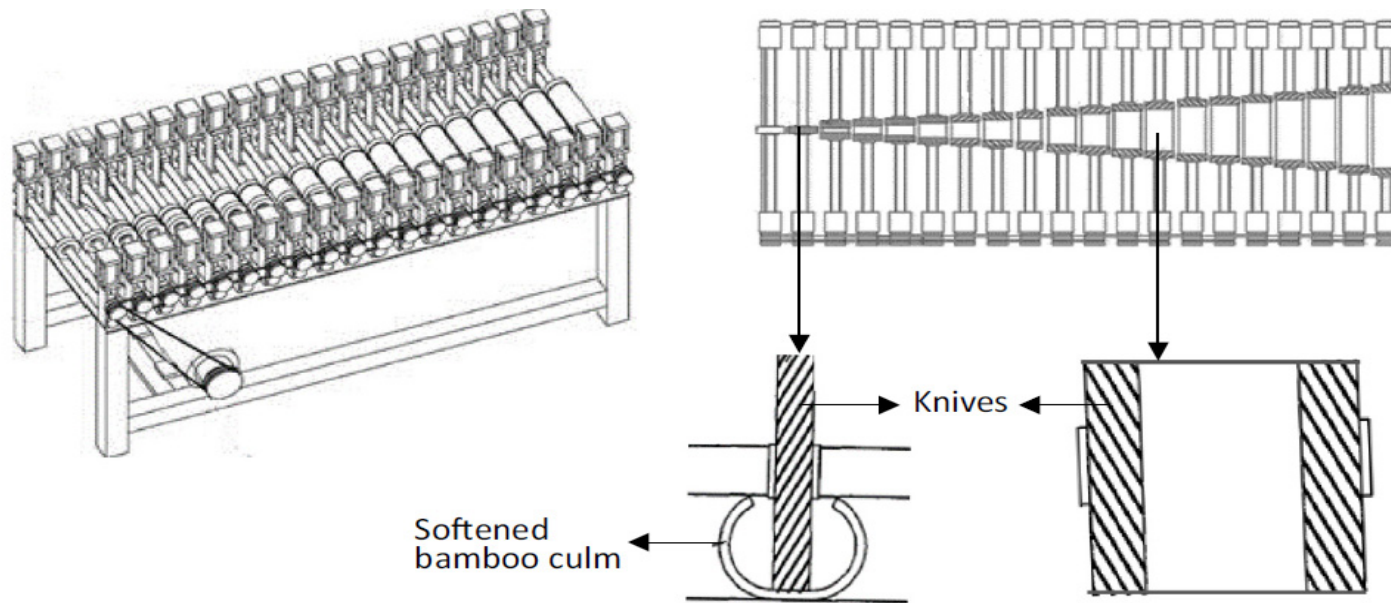
Bamboo flattening by making indentations on inner surface.



### 三、竹产业融合发展阶段(2010-至今)

## From 2010: Integrated development of bamboo industry

- 竹展平技术开发和应用 Development and application of bamboo culm flattening technology

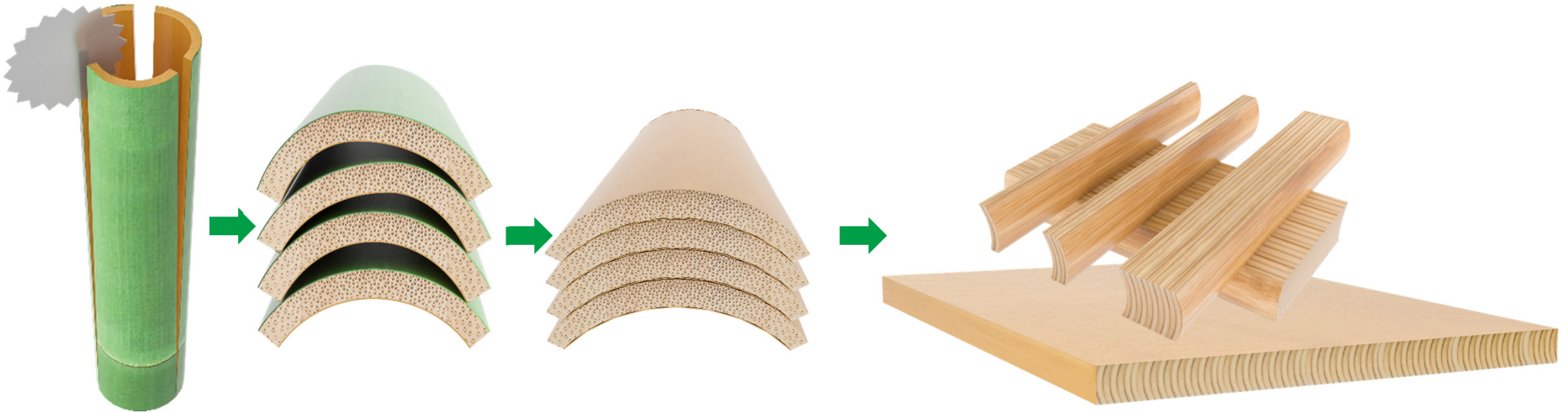


Bamboo flattening by making diagonal cuts on inner surface. Top left: flattening device. Top right: top view of the flattening device.

### 三、竹产业融合发展阶段(2010-至今)

#### From 2010: Integrated development of bamboo industry

- 新型弧形竹片复合材的研发 Development of a novel engineered bamboo products made with arc-shaped bamboo strips





### 三、竹产业融合发展阶段(2010-至今)

## From 2010: Integrated development of bamboo industry

### ➤ 竹缠绕复合管道开发和应用 Development and application of Bamboo winding composite pipe

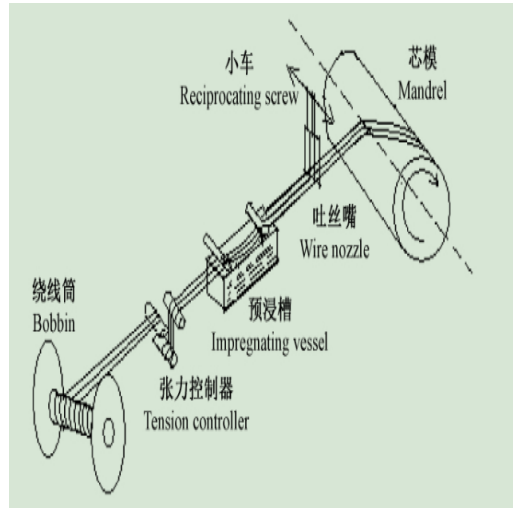
Bamboo  
sliver



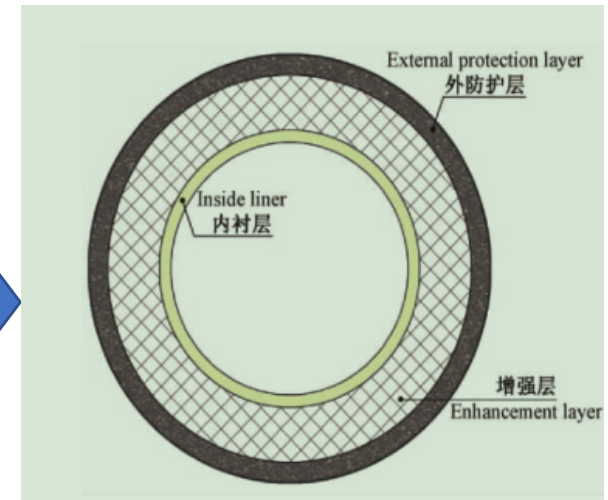
Resin



Bio-residue  
filler



Winding process



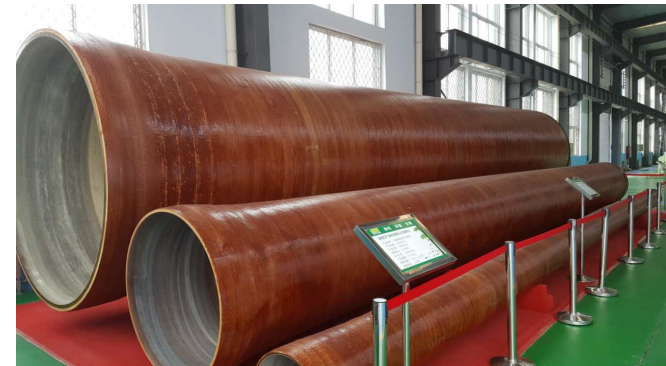
Bamboo winding  
composite pipe



Bamboo



Bamboo sliver curtain



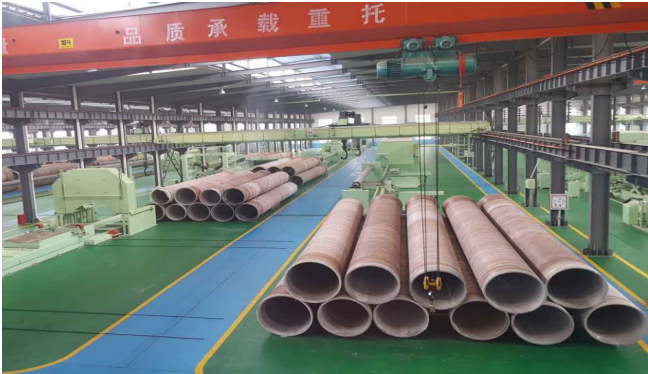
BWCP



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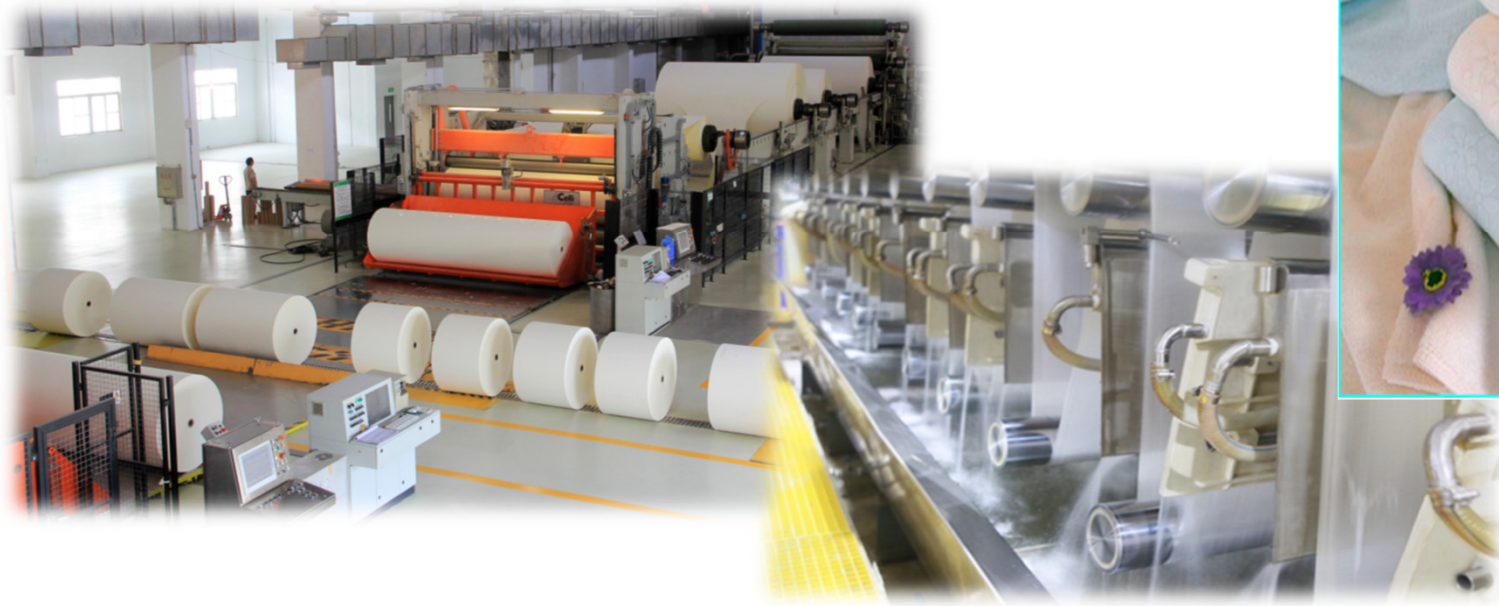




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## From 2010: Integrated development of bamboo industry

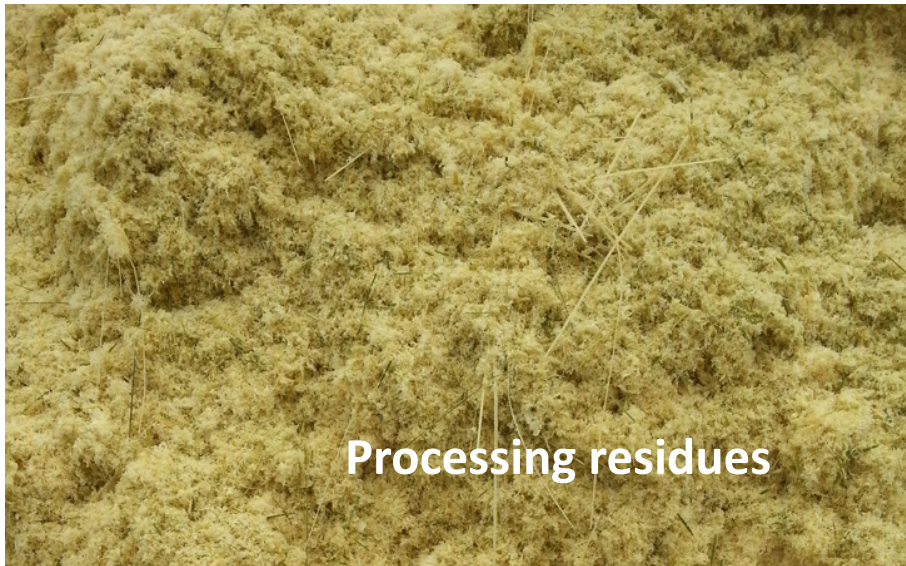
### ➤ 竹纤维在纺织品上的应用 Application of Bamboo Fiber in Textiles



### 三、竹产业融合发展阶段(2010-至今)

#### From 2010: Integrated development of bamboo industry

- 竹材生物质固体颗粒燃料制备技术 Development and application of bamboo biomass solid pellet fuel





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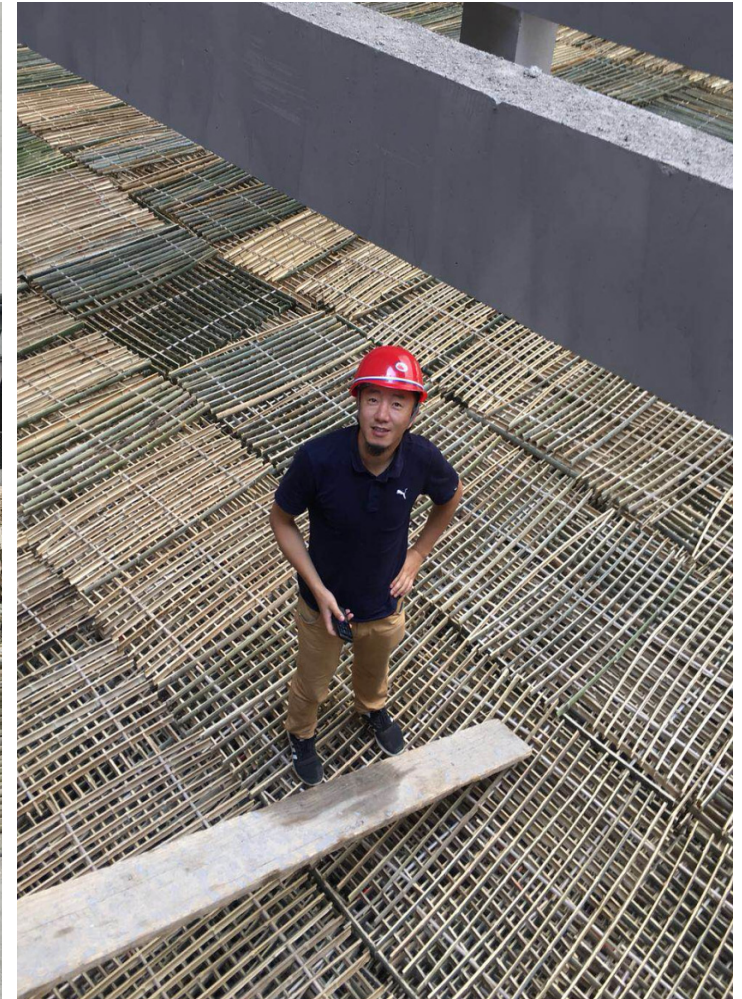
➤ 以竹代塑产品开发 Promote bamboo as a low-carbon substitute for plastics

● 竹制淋水填料代替塑料填料在工业冷却塔中的应用

Bamboo Grid Packing (replacing PVC packing) Used in Cooling Tower



PVC薄膜填料





### 三、竹产业融合发展阶段(2010-至今)

## From 2010: Integrated development of bamboo industry

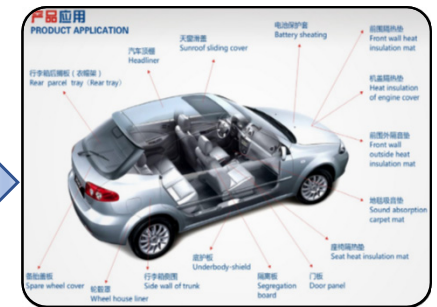
### ➤ 以竹代塑产品开发 Promote bamboo as a low-carbon substitute for plastics

#### ● 在汽车中的应用

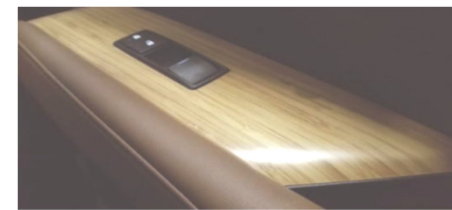
#### Application in vehicle



深度  
模压



软化  
刨切





### 三、竹产业融合发展阶段(2010-至今)

#### From 2010: Integrated development of bamboo industry

- 以竹代塑产品开发 Promote bamboo as a low-carbon substitute for plastics
  - 竹编土工格栅 Bamboo-woven geogrid



(土工格栅) 河道堤坝护坡、道路护坡、道路路基软基处理

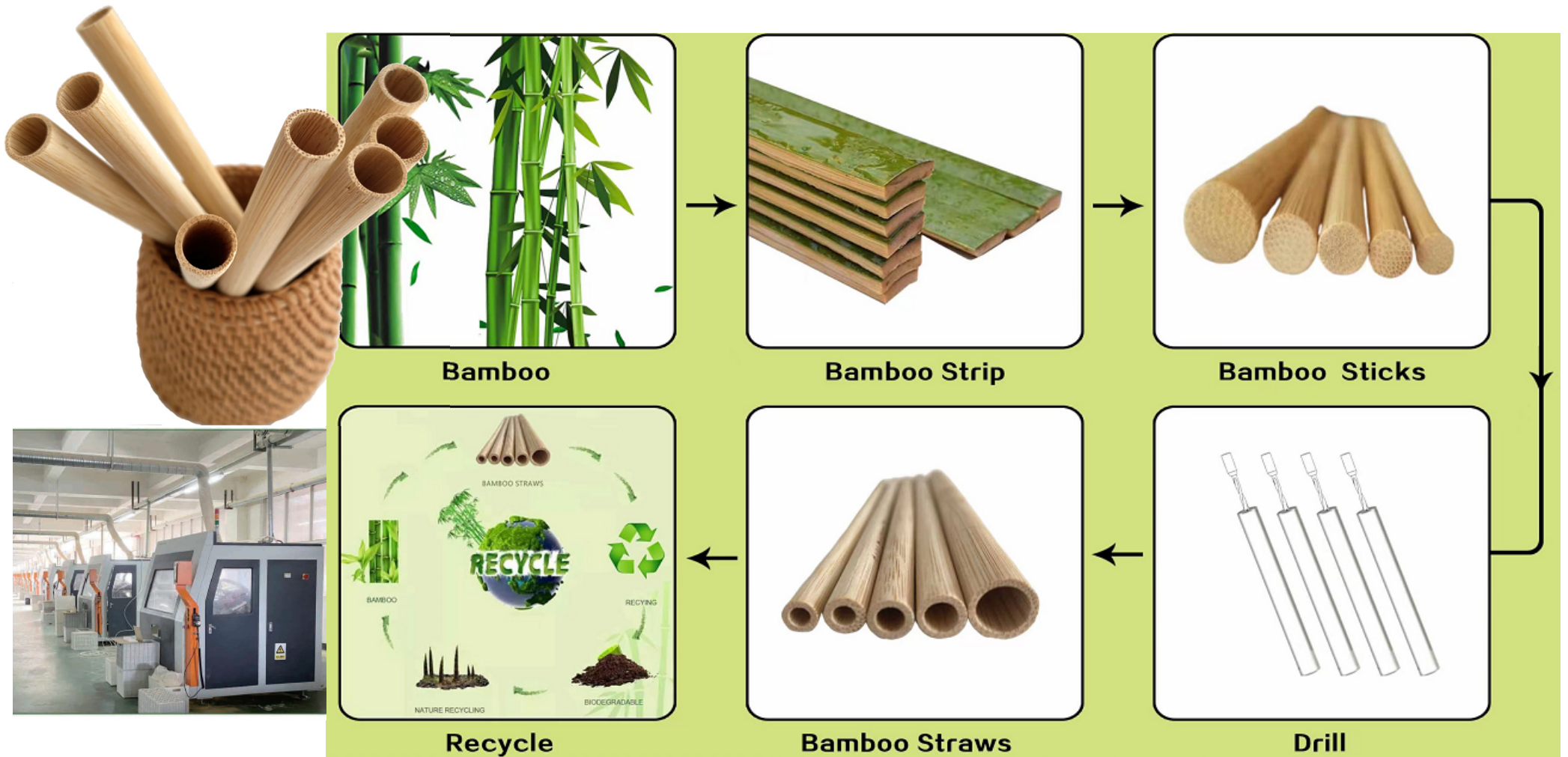


### 三、竹产业融合发展阶段(2010-至今)

## From 2010: Integrated development of bamboo industry

➤ 以竹代塑产品开发 Promote bamboo as a low-carbon substitute for plastics

- 竹饮用吸管 Bamboo Drinking Straws



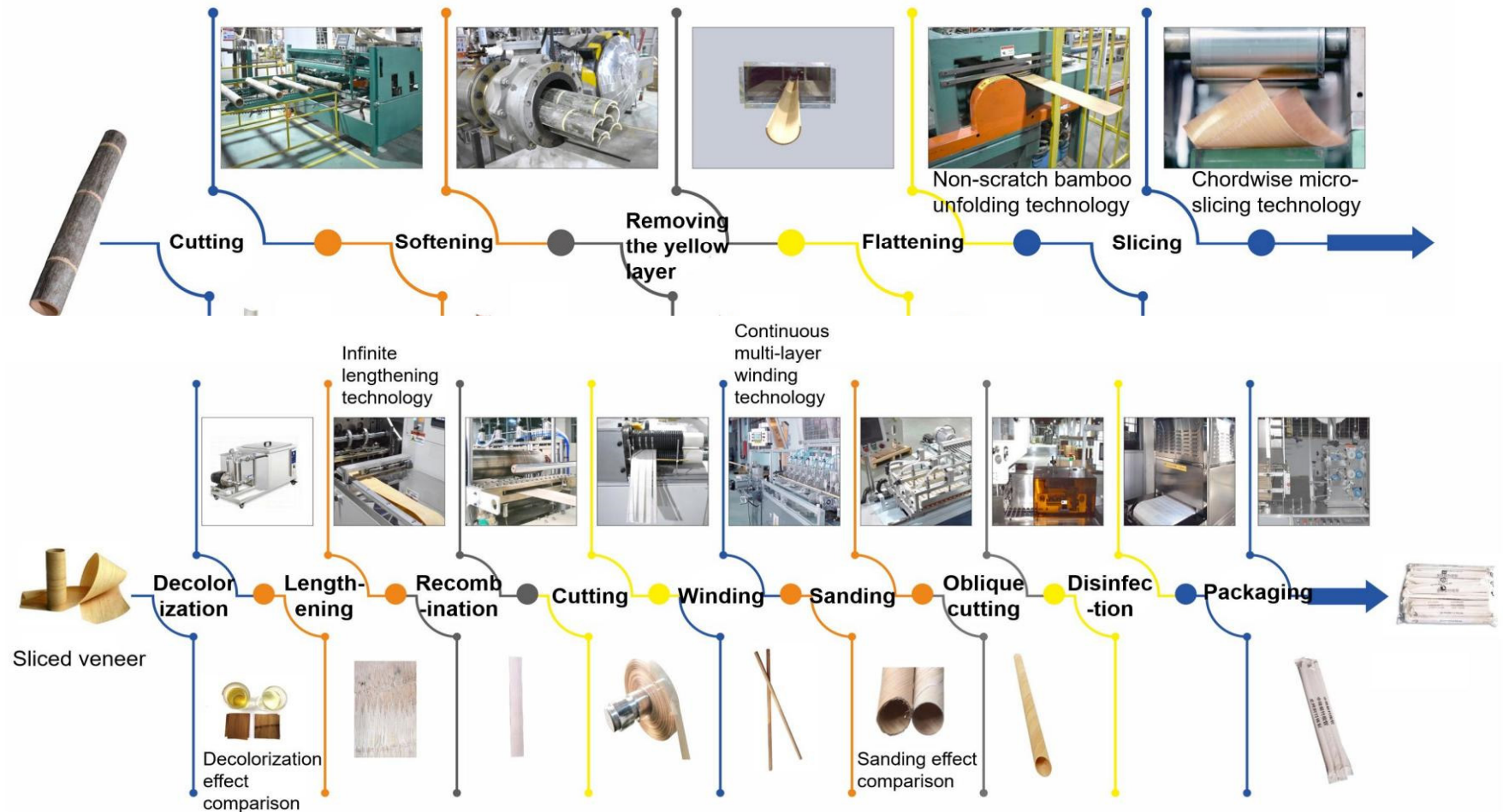


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## From 2010: Integrated development of bamboo industry

➤ 以竹代塑产品开发 Promote bamboo as a low-carbon substitute for plastics

### ● 竹饮用吸管 Bamboo Drinking Straws



### 三、竹产业融合发展阶段(2010-至今)

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➤ 以竹代塑产品开发 Promote bamboo as a low-carbon substitute for plastics





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From 2010: Integrated development of bamboo industry

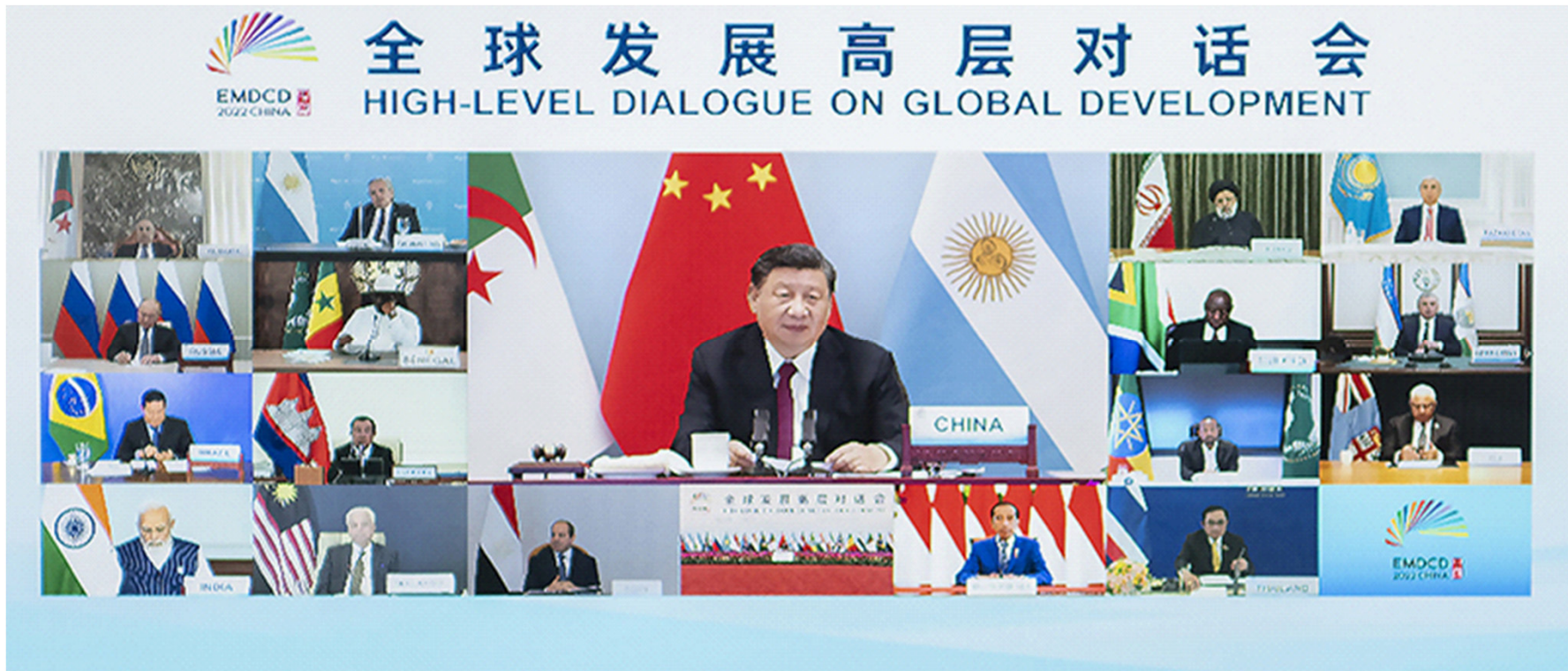
➤ 以竹代塑产品开发 Promote bamboo as a low-carbon substitute for plastics



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#### From 2010: Integrated development of bamboo industry

- 以竹代塑产品开发 Promote bamboo as a low-carbon substitute for plastics



**“Replacing plastic with bamboo” to reduce plastic pollution and tackle climate change was listed in the deliverables of the “High-level Dialogue on Global Development” held on 24 June 2022**

**2022年6月24日，全球发展高层对话会上提出“以竹代塑”倡议**



### 三、竹产业融合发展阶段(2010-至今)

#### From 2010: Integrated development of bamboo industry

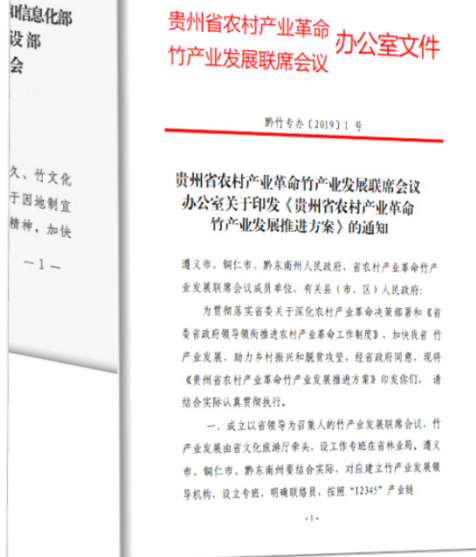
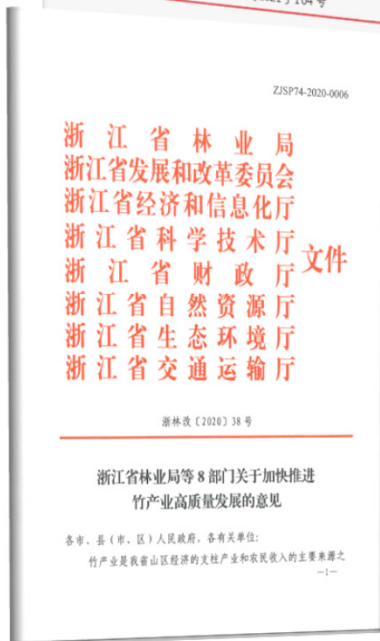
- 竹子综合利用及全生命周期评价 Bamboo Comprehensive Utilization and Life Cycle Assessment



### 三、竹产业融合发展阶段(2010-至今)

## From 2010: Integrated development of bamboo industry

- 各级政府相继出台支持竹产业发展政策 Governments at all levels have successively issued policies to support the development of bamboo industry





### 三、竹产业融合发展阶段(2010-至今)

## From 2010: Integrated development of bamboo industry

### ➤ 竹产业园建设 Bamboo Industrial Park





2018年9月3日，习近平总书记在“2018年中非合作论坛北京峰会”开幕式上的主旨讲话中提出：**建设中非竹子中心，帮助非洲开发竹藤产业。**

On Sept. 3, 2018, Chinese President Xi Jinping delivered a keynote speech at the opening ceremony of the 2018 Beijing Summit of the Forum on China-Africa. **“A China-Africa bamboo center will be established to help Africa make bamboo and rattan products.”**





**谢谢!**  
**Thank you!**  
**Merci!**

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