



# **Introduction of PSF Production Line**

**CHINA TEXMATECH CO., LTD.**



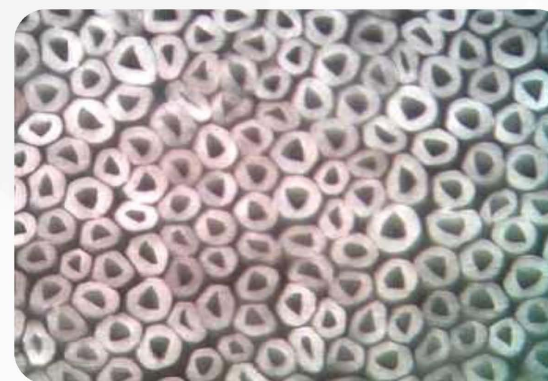
# Introduction of PSF Production Line

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- The PSF machinery were manufactured in early 1970s.
- In middle 1990s, we began to research and develop 100t/d production line; and in 2002, this line was put into production.
- Developed the whole set of 120t/d production line in 2003.
- From 2005 to 2011, the 150t/d product line was put into batch production.
- In 2012, the 200t/d PSF product line ran successfully.
- Recent max. capacity of one line: 225t/d.
- More than 200 lines have been running successfully all over the world, in which more than 100 are of large capacity.
- Till now, first-class fiber rate can reach over 98% and that of high-class fiber is over 95%.

# Suitable fiber variety

- Cotton fiber with high strength and low stretch
- Middle and long fiber
- Wool type staple fiber
- Fine denier fiber
- Functional fiber
- Profile fiber
- Sea-island fiber
- Colored fiber
- Modified fiber
- Three-dimensional crimp and hollow staple fiber
- Sewing thread with high strength and low stretch
- Low melting point fiber
- Composite fiber



# Main Fiber Variety

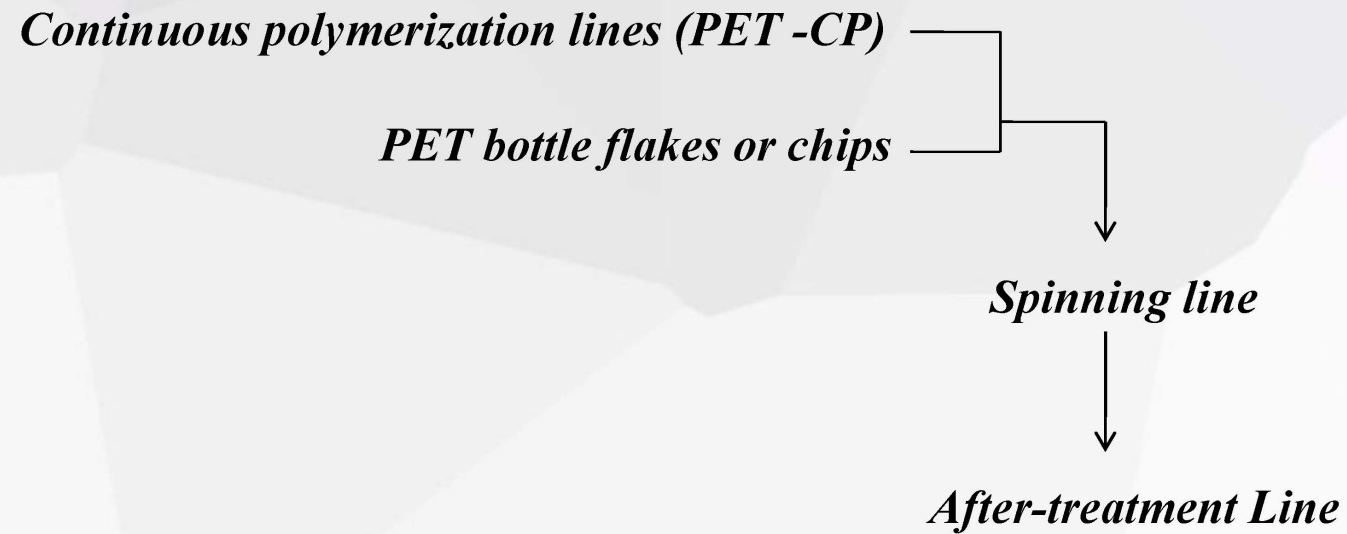


Solid Fiber	
Capacity	25t/d-225t/d
Denier	0.8D,1.0D,1.2D,1.4D,1.5D
Raw Material	Polymer, chips, bottle flakes
Cut Length	32mm, 38mm, 44mm,51mm etc.
Variety	Dull, semi-dull, bright, DB, colored, high tenacity (6.5 gpd), super high-tenacity (7 gpd)
Purpose	Spin, sewing thread, non-woven

Conjugated Hollow Fiber	
Capacity	25t/d-150t/d
Denier	6D,7D,15D
Raw Material	Polymer, chips, bottle flakes
Cut Length	52mm, 64mm, 72mm, 102mm
Purpose	Filling Material

# Introduction of PSF Production Line

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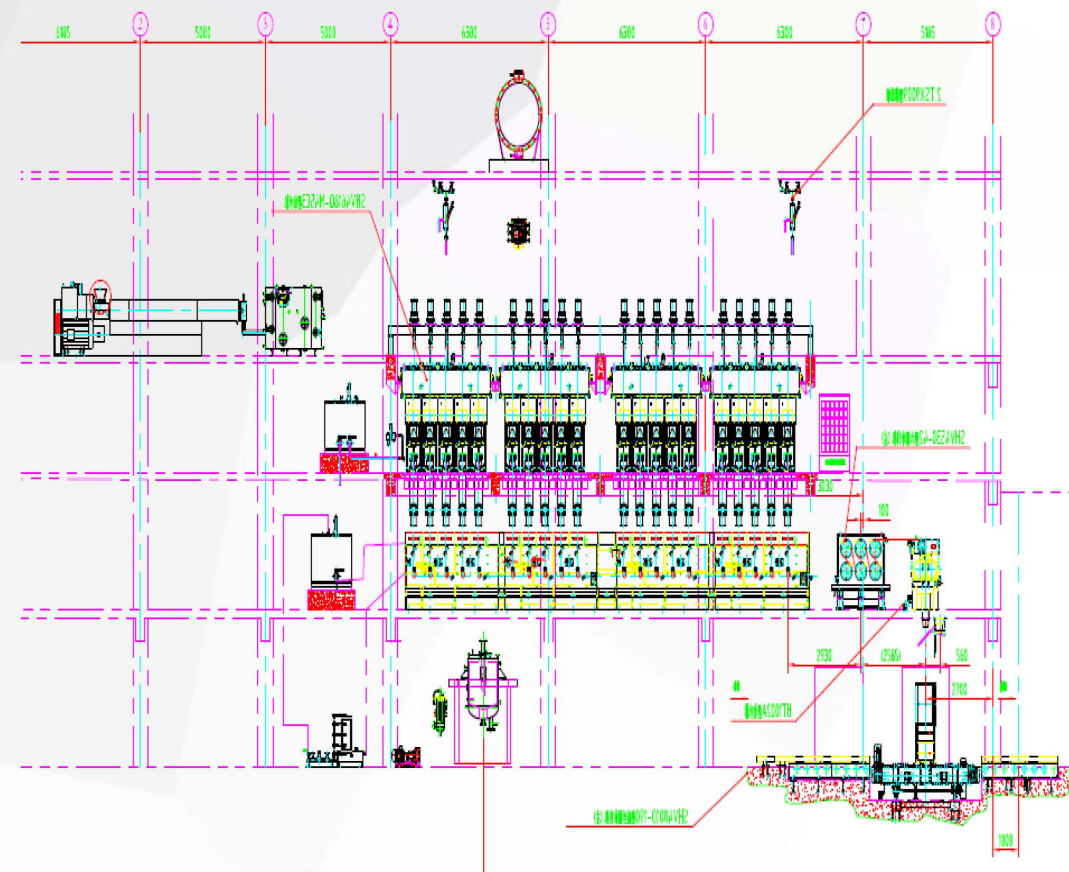


# Introduction of PSF Production Line

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## **Process flow of polyester spinning line from bottle flakes or chips**

Polyester bottle flakes or chips – Heated and dried-hopper-Screw extruder –Melt filter – Spinning beam – Metering pump-Spinning packs –Quenching system-Spinning tunnel- Take-up machine – Capstan – Traverse machine (fiber cans)





# Introduction of PSF Production Line

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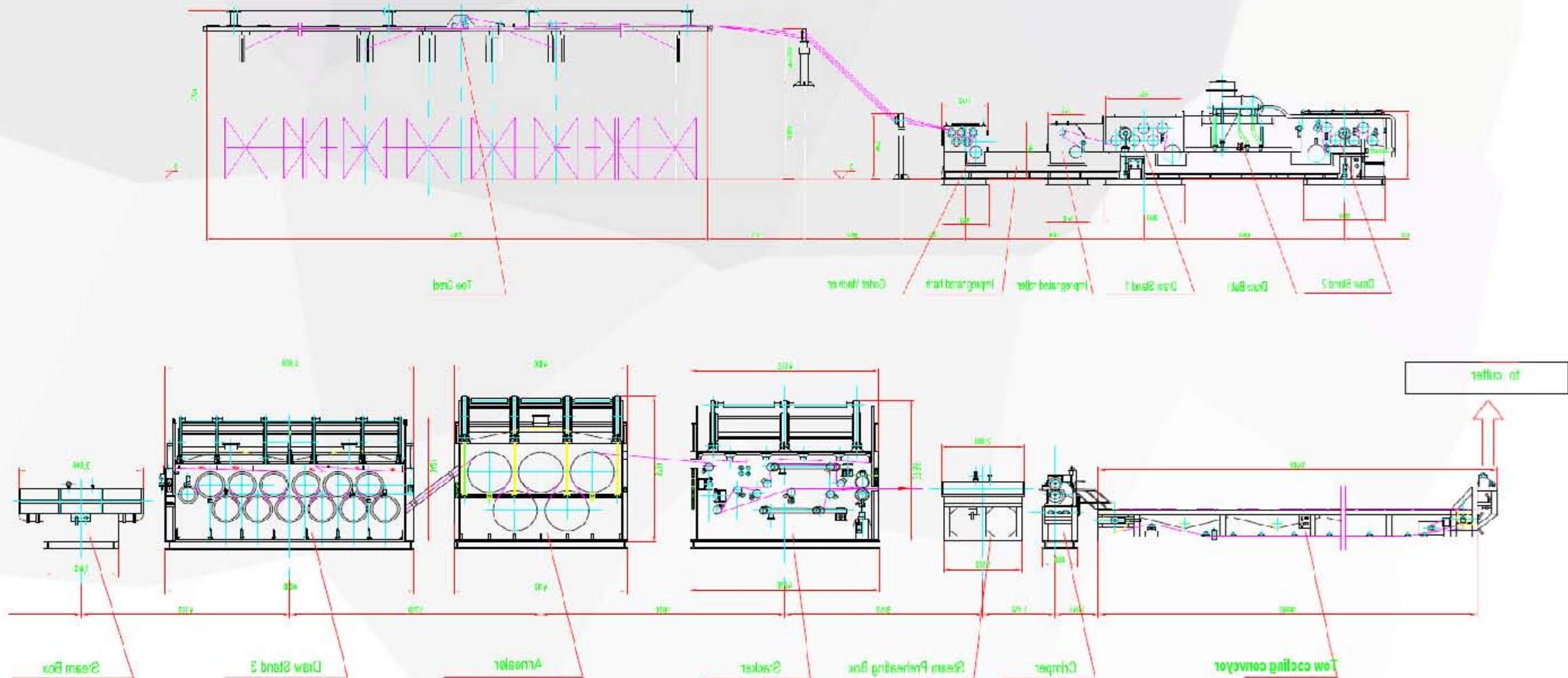
## Process Flow of Polyester After-treatment Line

*(Toyobo process route)*

Creel – Prefeed Module (5 rollers + 1 immersion roller) – Immersion Bath – Immersion Roller – Draw Stand 1 ( 5 rollers + 1 immersion roller) – Draw Bath – Draw Stand 2 (5 rollers + 1 immersion roller) – Steam Heating Box – Draw Stand 3 (12 rollers) – Annealer (5 rollers) – Oiling Stack – (Trio – Tension Roller) – Pre-crimper Heating Box – Crimper – Cooling Conveyor (or Tow Plaiter – Dryer) – Oil Sprayer – Tension Stand – Cutter - Baler



*Flow Chart – Fibre line (Toyobo process route)*





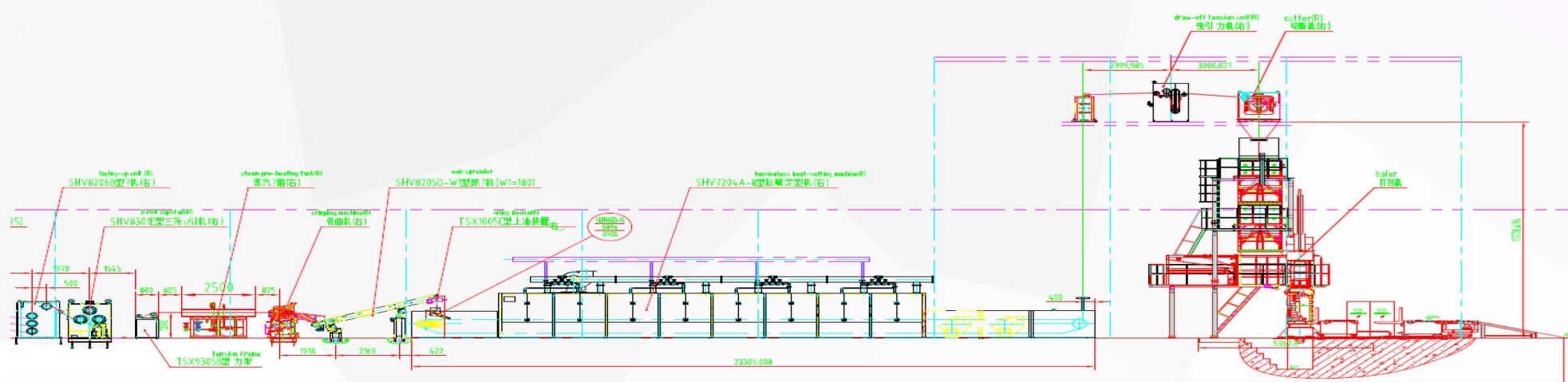
# Introduction of PSF Production Line

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## Process Flow of Polyester After-treatment Line

*(Fleissner process route)*

Creel – Prefeed Module (7 rollers) – Immersion Bath – Draw Stand 1 ( 7 rollers ) – Draw Bath – Draw Stand 2 (7 rollers) – Steam Heating Box – Annealer (18 jacket rollers) – Cooling Sprayer – Draw Stand 3 (7 rollers) – Tow Stacker — Trio – Tension Roller – Pre-crimper Heating Box – Crimper — Tow Plaiter – Dryer – Tension Stand – Cutter – Baler

[illegible]

# Introduction of PSF Production Line



*3D design*



**CHINA TEXMATECH CO., LTD.**



# PSF Production Machinery

## *Screw extruder*

- For melting and mixing the PET bottle flakes or chips from hopper after being heated and dried.
- Diameter series of screws:  $\Phi 120/\Phi 150/\Phi 160/\Phi 170/\Phi 180/\Phi 190/\Phi 200$ .
- With L/D ratio of 24-27 mainly for PET chips, with L/D ratio of more than 27 mainly for bottle flakes.
- one extruder max for 16 positions because of the melt pipe design and also thermal insulation limited



# PSF Production Machinery

## *Spinning beam and related equipment*

- Specially designed distribution piping system to guarantee same dwell time and same pressure for reaching each spinning position.
- The pin valve fixed before each spinning position to ensure each position in normal operation.
- High –precision metering pump to provide continuous melt in high pressure and accuracy into spin pack . Driven by synchronous motor and with vertical type or horizontal type.
- Heat transfer oil system or Biphenyl circulation vapor system to ensure uniform temperature on each position .

Spinneret hole No. : 2592、 2808、 3024、 3795、 4984、 5300、 5700、 7000 etc.

Spinneret Dia:  $\Phi 260$ ,  $\Phi 280$ ,  $\Phi 328$ ,

**$\Phi 358$  with ring oiling ,  $\Phi 410$**



# PSF Production Machinery

## *Quenching area*

- Monofilament cooled by air flow with certain temperature ,angel and speed from quenching area for ensuring good yarn quality .
- The system provide high-level automation ,uniform cooling result and comfortable working environment.
- With cross quenching ,outer circular quenching and inner circular quenching type depending on different production requirement.





# PSF Production Machinery

## *Other equipment for spinning line*

- Oiled and damped for filament to increase the cohesion of yarn and reduce the friction by oiling device in take-up machine with inverter-controlled .
- Drawing-off unit and sunflower wheels driven by asynchronous motor with low speed set for yarn string-up and easy operation .
- Gear drive is employed for the feeding machine to ensure top precision ,low noise and stable operation.
- Can traversing unit driven by A.C motor to realize the transporting change of empty can , reciprocating movement of tow can and delivery of laden can.





# PSF Production Machinery

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## *Creel*

The tow creel is arranged for 4 rows .

Including: two rows put into using ,other two for preparing.

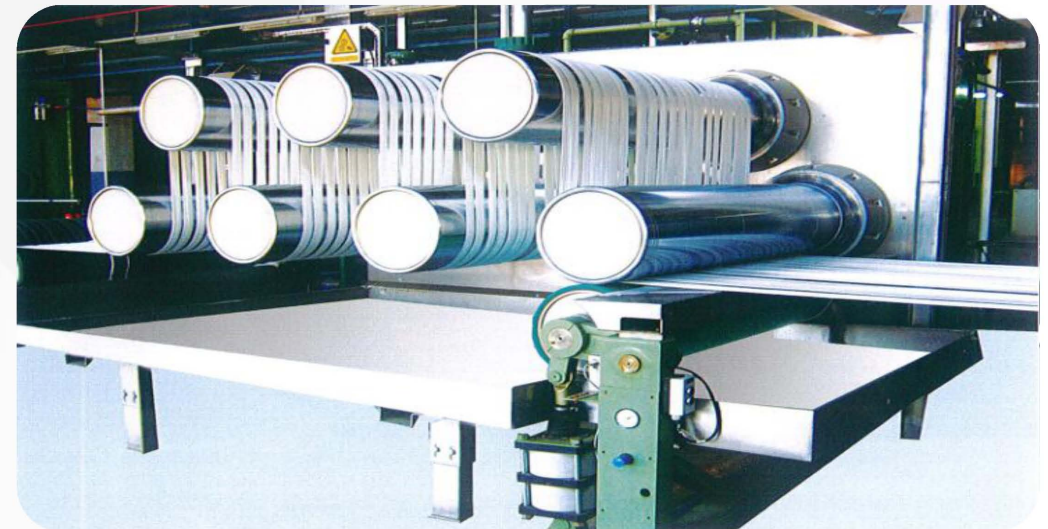


# PSF Production Machinery

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## *Tow guide frame and DIP bath*

- The tows from tow creel guided by tow guide frame and passed through DIP bath .
- Split tow sheets evenly with certain width and thickness for next drawing process .





# PSF Production Machinery

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## *Draw process*

- Realize the full orientation of molecular structure for the tows after going through drawing process .
- The first drawing stage carries put between draw stand I and draw stand II .
- The temperature of draw bath :around 60°C to 80°C.
- The draft ratio of first drawing stage: 80% to 85%
- The second drawing stage carries in steam draw chest between draw stand II and draw stand III.
- Tow sheet heated by spraying steam in steam draw chest and temperature is around 95°C to 100°C.
- The draft ratio of first drawing stage: 15% to 20%

# PSF Production Machinery



Draw stand I



Draw stand II



Annealer



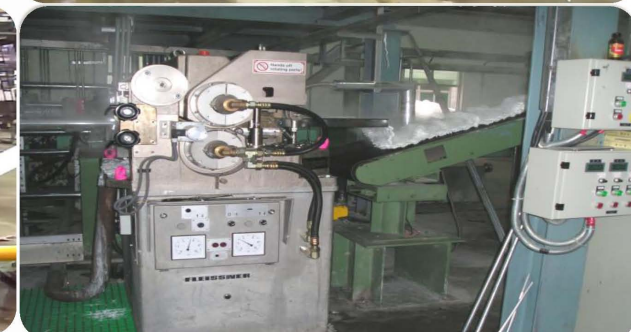
Draw stand III



# PSF Production Machinery

## *Crimping process*

- Tow stacker to realize 2 or 3 tow sheets stacked into 1 tow sheet .
- Steam pre heating box to pre-heat the tow sheet before crimper.
- The tow sheet is crimped through squeezing to assure the good performances



# PSF Production Machinery

## *Cutting process*

- Tows spread to chain board type conveying of relaxing dryer after oiling to realize tows cooled down below glass temperature .
- Tension stand to guarantee the tows under tension evenness to feed cutter in tangential direction of cutting reel.
- Cutter to cut the tows into fixing length of staple according to the process requirement.





# PSF Production Machinery

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## *Baler*

- After cutting, the cut fiber enter into baler chamber in gravity or through conveyor for baling , then the bale is manual baling and labeling ,finally sent to the storage by fork lifter



# Introduction of PSF Production Line



Screw Extruder



Spin beam (Metering pump)



# Introduction of PSF Production Line

Out-To-In Quench (Toyobo type)



Take-up machine (double-side oiling)



# Introduction of PSF Production Line



Take-up machine, Draw-off unit, Feeding machine



# Introduction of PSF Production Line



Draw line (Type of Fleissner process route)



# Introduction of PSF Production Line



Draw line (Type of Fleissner process route)



Annealer (Jacket type annealer)



# Introduction of PSF Production Line



**Crimper (Capacity: 50000 tons per year)**



**Crimper (Capacity: 60000 tons per year)**



# Introduction of PSF Production Line



**Baler (Capacity: 60000 tons per year)**



**New designed Baler (Capacity: 240 TPD)**



# Certificate and Patents



- 123 National patents
- 18 invention patents
- 36 provincial-ministerial awards
- Take charge of or join in establishing 60 national standards in textile industry



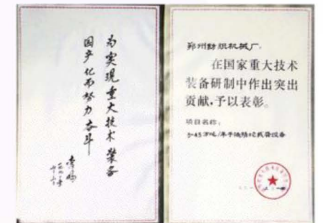
# Certificate of Qualification and Honor



ISO9001-2008



Design License of Special equipment



National Certificate

# Patent Technique



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中华人民共和国国家知识产权局

邮政编码: 450052 A

河南省郑州市嵩山南路81号  
郑州中民专利代理有限公司  
郭中民

发文日期:  
2004 年 9 月 16 日

申请号: 200420074683.7

**专利申请受理通知书**

根据中华人民共和国专利法第二十八条及其实施细则第三十九条、第四十条的规定, 申请人提出的专利申请国家知识产权局专利局予以受理。现将确定的申请号和申请日通知如下:

申请号: 200420074683.7

申请日: 2004 年 9 月 16 日

申请人: 郑州纺织机械股份有限公司

实用新型名称: 一种牵伸定型辊筒

经核实确认国家知识产权局专利局收到如下文件:

请求书	每份页数:2	份数:2	摘要	每份页数:1	份数:2
摘要附图	每份页数:1	份数:2	权利要求书	每份页数:1	份数:2
说明书	每份页数:3	份数:2	说明书附图	每份页数:3	份数:2
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审查员:002; 0438-4-C10242

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专利局郑州专利受理处

Roller of DS

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中华人民共和国国家知识产权局

邮政编码: 450052 A

河南省郑州市嵩山南路81号  
郑州中民专利代理有限公司  
郭中民

发文日期:  
2004 年 9 月 16 日

申请号: 200420074682.2

**专利申请受理通知书**

根据中华人民共和国专利法第二十八条及其实施细则第三十九条、第四十条的规定, 申请人提出的专利申请国家知识产权局专利局予以受理。现将确定的申请号和申请日通知如下:

申请号: 200420074682.2

申请日: 2004 年 9 月 16 日

申请人: 郑州纺织机械股份有限公司

实用新型名称: 用于涤纶短纤维后处理设备中的冷却喷淋装置

经核实确认国家知识产权局专利局收到如下文件:

请求书	每份页数:2	份数:2	摘要	每份页数:1	份数:2
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2. 申请号是国家知识产权局给予每一件被受理的专利申请的代号, 是该申请最有效的识别标志。申请人向我局办理各种手续时, 均应准确、清晰写明申请号。
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审查员:002; 0438-4-C10242

中华人民共和国国家知识产权局  
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Cooling spraying device

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中华人民共和国国家知识产权局

邮政编码: 450052 A

河南省郑州市嵩山南路81号  
郑州中民专利代理有限公司  
郭中民

发文日期:  
2004 年 11 月 11 日

申请号: 200420075097.4

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申请号: 200420075097.4

申请日: 2004 年 11 月 11 日

申请人: 郑州纺织机械股份有限公司

实用新型名称: 多单元变频同步控制装置

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说明书 <td>每份页数:5</td> <td>份数:2<td>说明书附图<td>每份页数:12</td><td>份数:2</td></td></td>	每份页数:5	份数:2 <td>说明书附图<td>每份页数:12</td><td>份数:2</td></td>	说明书附图 <td>每份页数:12</td> <td>份数:2</td>	每份页数:12	份数:2
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中华人民共和国国家知识产权局  
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Multi-unit frequency conversion remote  
synchronous control system

CHINA TEXMATECH CO., LTD.

# Introduction of PSF Production Line

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## Consumption index of main material

Item	Unit	Average
Melt	Kg/Ton	1025
Bottle Flakes	Kg/Ton	1035~1085
Oil	Kg/Ton	3.5~5.0

# Introduction of PSF Production Line

## Plant Labor Requirement

Department/ Qualifications	No. per shift	Sub-total
<b>Production and Quality Control</b>		
Section Chief	1 per day	1
Process Engineer for Staple spinning	1 per day	1
Operators for Staple spinning	4	16
Process Engineer for Draw line	1 per day	1
Operators for Draw line	10	40
Clerical	2 per day	2
Finish oil preparation/ Auxiliary	2 per day	2
Pack Preparation, Cleaning, Spinneret inspection	2 per day	3
Textile laboratory technician	2 per day	2
Textile laboratory technician	1	4
Sub-total		70
<b>Maintenance</b>		
Mechanical maintenance	4 per day 2 per shift	4 8
Electrical maintenance	2 per day 1 per shift	2 4
Instrumentation and control maintenance	2 per day 1 per shift	2 4
Shift foreman	1	4
Sub-total		28
GRAND TOTAL		98

# Fiber Index (For Reference)



No.	Items	Solid Fiber						Mid Fiber			Wool Type		
		High-Tenacity			Normal								
		Best	Grade A	Qualified	Best	Grade A	Qualified	Best	Grade A	Qualified	Best	Grade A	Qualified
1	Tenacity at break(CN/dtex) ≥	5.5	5.3	5	5	4.8	4.5	4.6	4.4	4.2	3.8	3.6	3.3
2	Elongation at break/%	M1±4.0	M1±5.0	M1±8.0	M1±4.0	M1±5.0	M1±10.0	M1±6.0	M1±8.0	M1±12.0	M1±7.0	M1±9.0	M1±13.0
3	Vibration of linear density ±	3	4	8	3	4	8	4	5	8	4	5	8
4	Vibration of length ±	3	6	10	3	6	10	3	6	10	——	——	——
5	Over length fiber ≤	0.5	1	3	0.5	1	3	0.3	0.5	1	——	——	——
6	Multiple length fiber/(mg/100g) ≤	2	3	15	2	3	15	2	6	30	5	15	40
7	Defects/（mg/100g）≤	2	6	30	2	6	30	3	10	40	5	15	50

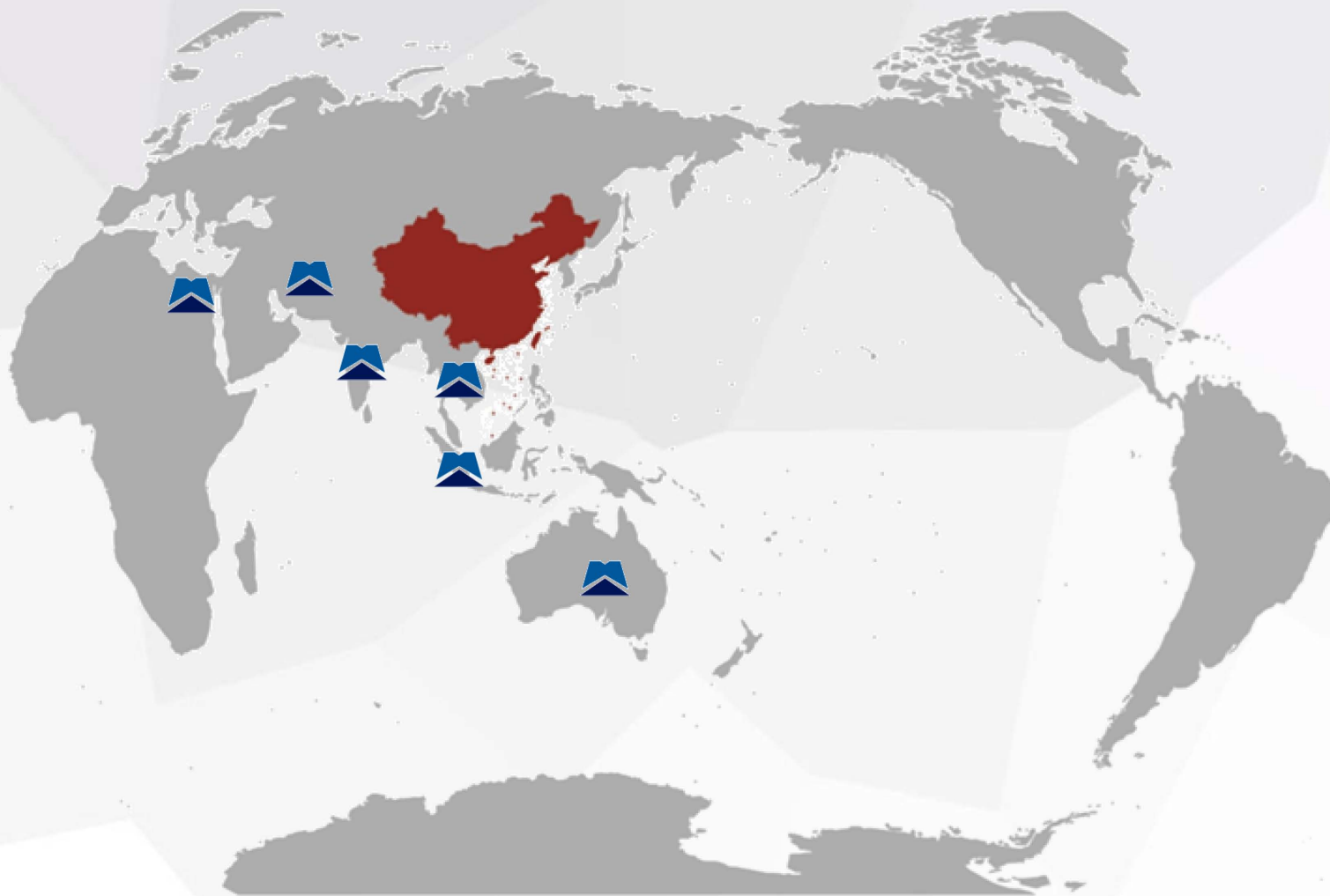
# Fiber Index (For Reference)



No.	Items	Solid Fiber						Mid Fiber			Wool Type		
		High-Tenacity			Normal								
		Best	Grade A	Qualified	Best	Grade A	Qualified	Best	Grade A	Qualified	Best	Grade A	Qualified
8	Number of crimp /(pc/25mm)	M2±2.5	M2±3.5		M2±2.5	M2±3.5		M2±2.5	M2±3.5		M2±2.5	M2±3.5	
9	Crimp ratio/%	M3±2.5	M3±3.5		M3±2.5	M3±3.5		M3±2.5	M3±3.5		M3±2.5	M3±3.5	
10	Shrinkage at 180℃	M4±2.0	M4±3.0		M4±2.0	M4±3.0		M4±2.0	M4±3.0		M4±2.0	M4±3.0	
11	Specific resistance /Ω*cm ≤	M5×10 <sup>8</sup>	M5×10 <sup>9</sup>		M5×10 <sup>8</sup>	M5×10 <sup>9</sup>		M5×10 <sup>8</sup>	M5×10 <sup>9</sup>		M5×10 <sup>8</sup>	M5×10 <sup>9</sup>	
12	10% enlongation / (CN/dtex) ≥	2.8	2.4	2	——	——	——	——	——	——	——	——	——
13	Variation of break strength /≤	10	15		10	——	——	13	——	——	——	——	——

## Customers in Overseas Market for PSF Production line

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# **Introduction of Financing**



# Financial support

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- The Belt and Road Initiative
- Already provided over 500 Million USD financing support including India, Indonesia and Vietnam Market etc.
- Max seven years buyer's credit or supplier's credit financing support according to contract value and buyer's credit position .
- Necessary Document Requirement and Basic Requirement





# Brief Introduction of the project

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## Process of the Project

- Discuss for the production line with technical specification and commercial part
- Come to China for the running factory and workshop visiting / meeting with bank and Sinasure
- The evaluation made by bank and Sinasure according to the document from the company and third part investigate
- Wait the approval from the bank and Sinasure/ Confirm the final contract value
- Sign the contract and make the advance payment .
- Contract official effect and project start



# Brief Introduction of the project

## Project schedule for reference

Project items \ Months	Contract effective	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Contract effective	★															
Kick-off meeting		△														
Basic design meeting				▲												
Basic design documents delivered					—											
Detailed design meeting						▲										
Detailed design documents delivered						—	—									
Workshop civil work construction				—	—	—	—	—	—	—						
Equipment production				—	—	—	—	—	—	—						
Equipment delivery/shipment									—	—						
Equipment erection										—	—	—	—	—		
Utilities pipes and Cable tray erection											—	—	—	—		
Commissioning incl. equipment mechanical and trial production														—	—	—
Start-up commissioning incl. trial production and performance test															—	—



# Thanks