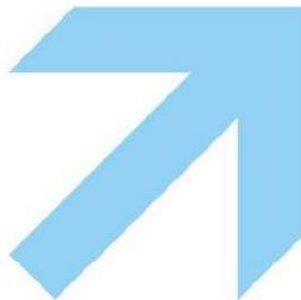




CASTING THE  
FUTURE  
WITH YOU

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## Continuous Casting Machine

CCTEC is able to provide casters for the following products:

- 1) Billet: 90~200mm
- 2) Bloom: 200×200 ~350×480mm
- 3) Slab: 135~300×500~2400mm
- 4) Round:  $\phi$  125~380mm



## Strip Processing Line

CCTEC is able to provide the following strip processing lines:

- 1) Pickling Line (Continuous Type and Push-Pull Type)
- 2) Continuous Hot-Dip Galvanizing Line (CGL)
- 3) Strip Color-Coating Line (CCL)
- 4) Skin-Pass Mill
- 5) Continuous Annealing Line
- 6) Strip Recoiling Line
- 7) Continuous Electroplating Line



## Automation

CCTEC Automation provides automation and control systems integrated with CCTEC Process technology, for all the casting machines, and strip processing lines of CCTEC.

As an Electrical & Automation system supplier, CCTEC Automation serves our customers with Engineering, Programming, Manufacturing, Commissioning and Training.



## Manufacture

◆ CCTEC manufactures its own mechanical equipment and electrical equipment, guaranteeing high quality products delivered on time.



## Certificates

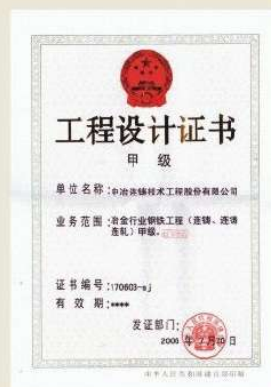
The quality control system of CCTEC ensures high quality throughout the whole process, from engineering to startup of the production line.

The followings are some main Certificates.

- 1) Quality Management System Certificate of ISO 9000:2001
- 2) CCC Certificate (China Compulsory Certificate)
- 3) Grade A Engineering Certificate of China
- 4) (CE) Verification of Conformity with European Directives



CCC Certificate  
 (China Compulsory Certificate)



Grade A Engineering Certificate of China

# Main Equipment

Billet Casting Machine

Slab Casting Machine

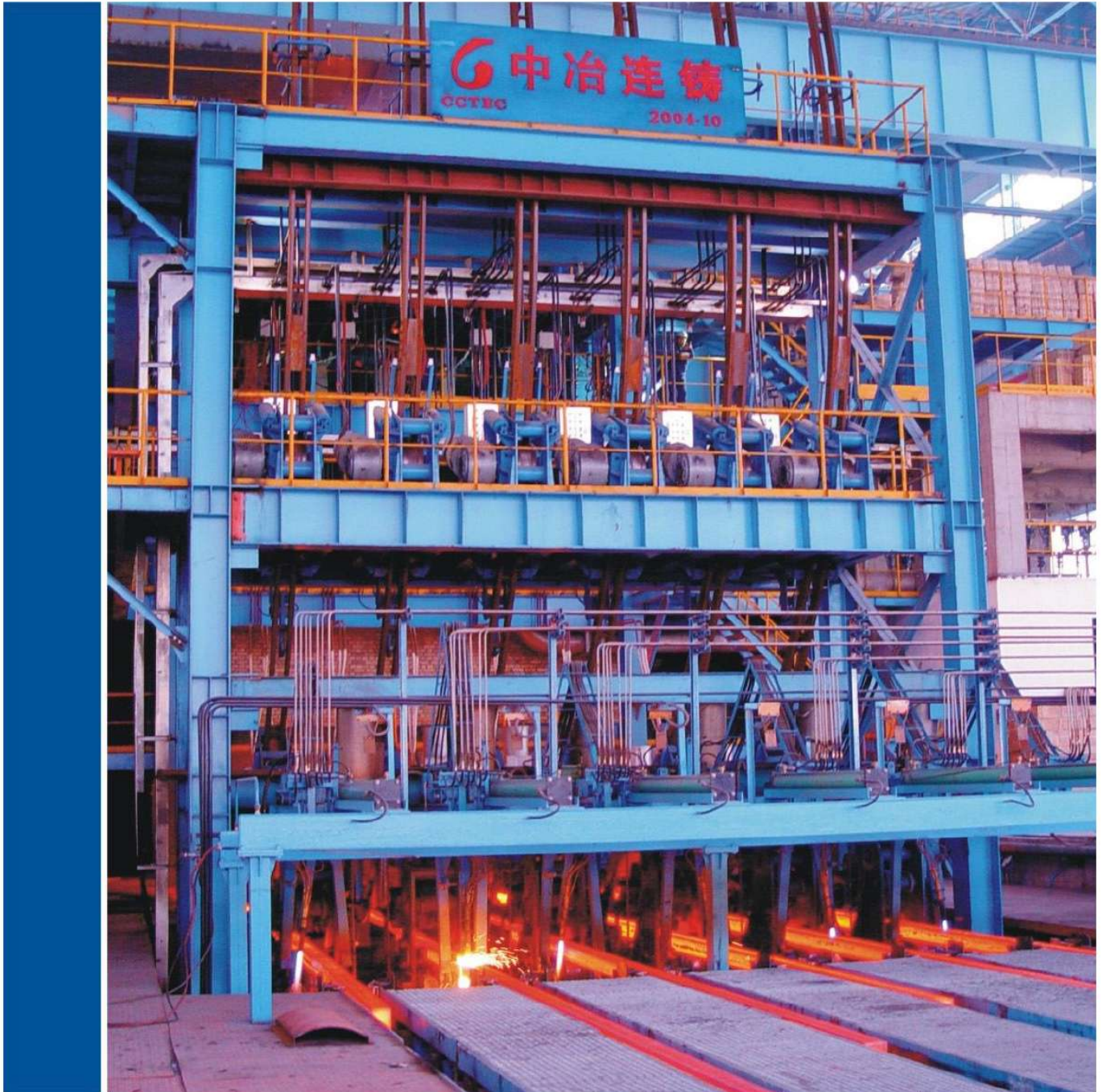
Strip Processing Line

Automation System



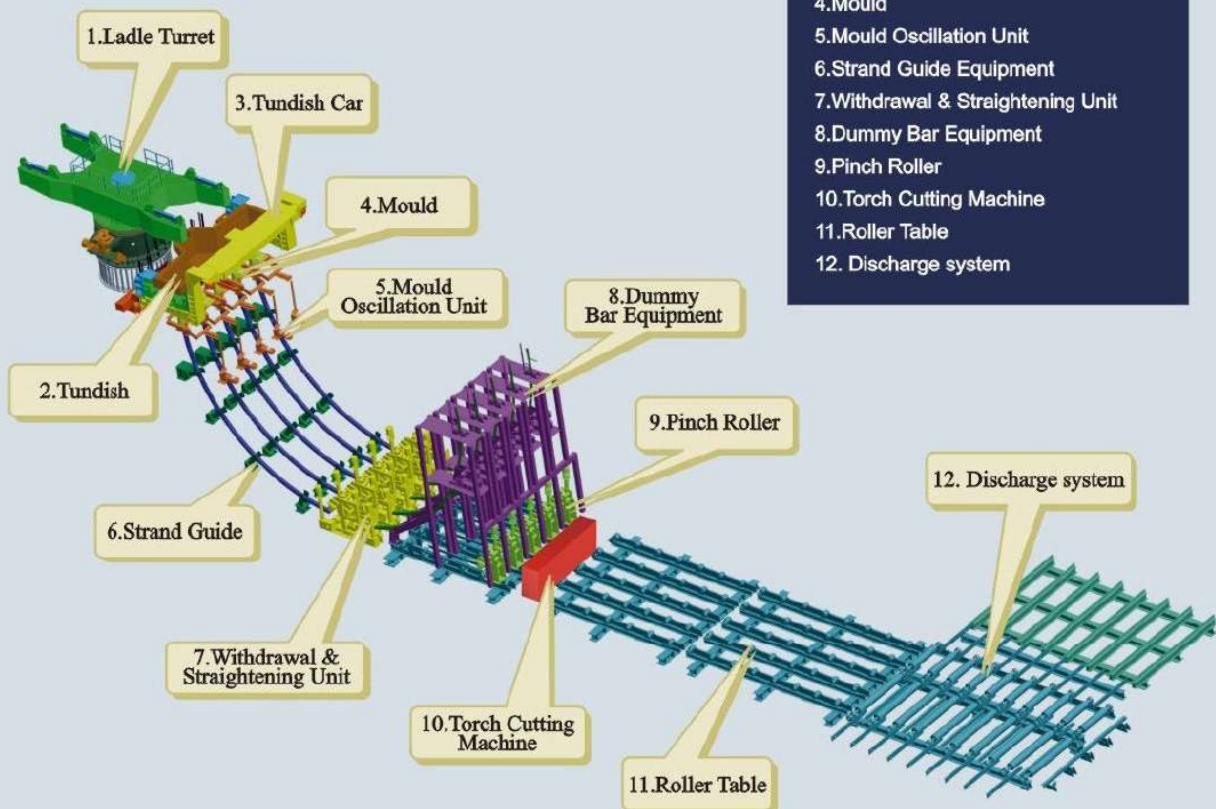
## 07 | Main Equipment

### >> Billet Casting Machine



## Main Equipment of Billet Casting Machine

### Layout of the Billet Casting Machine



09 | Main Equipment  
>> Billet Casting Machine



## Main Equipment

### 1. Ladle Turret

#### Function:

The turret turns the ladle 180° from the loading to casting position, depositing the steel into the tundish. Once the ladle has been emptied it turns back into the loading position for removal by the bay crane.

#### Types:

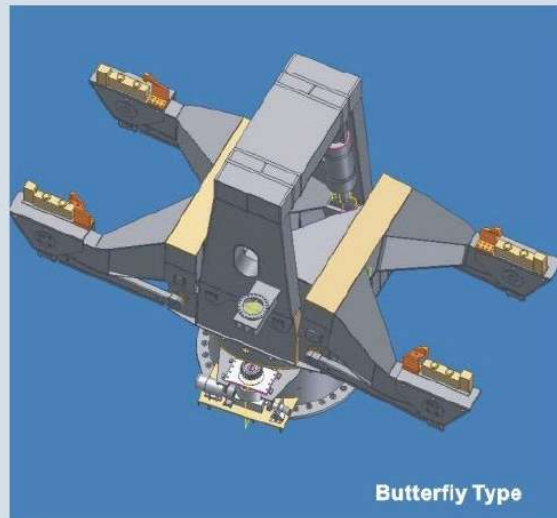
- (1) Straight Beam Type
- (2) Butterfly Type



Straight Beam Type



Butterfly Type



Butterfly Type

#### Features:

- (1) Straight Beam Type
  - Simple structure
  - Low cost
- (2) Butterfly Type
  - Easy operation
  - For protective casting



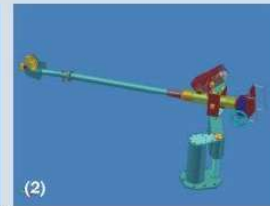
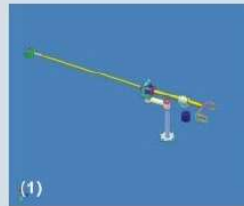
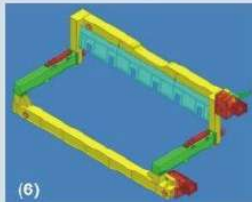
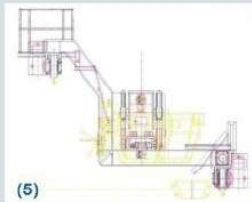
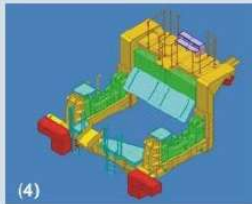
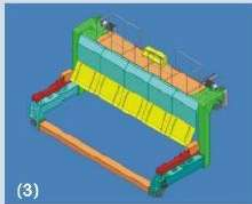
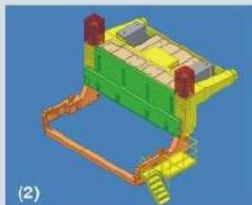
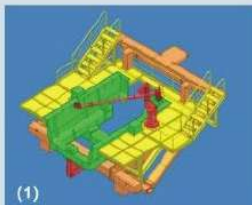
Tundish Car for I-shape Tundish

Main Equipment

## 2. Tundish Car

### Types:

- (1) Tundish Car for I-shape Tundish
- (2) Full Suspend Gantry-type Tundish Car
- (3) Guide Rod Tundish Car
- (4) Tundish Car with U-shape Hoisting Beam
- (5) Tundish Car with Twin-Cylinder
- (6) Semi-Gantry Tundish Car without Lifting and Lowing



## 3. Ladle Shroud Manipulator

### Function:

The ladle shroud manipulator moves the shroud tube to the underside of the ladle.

### Types:

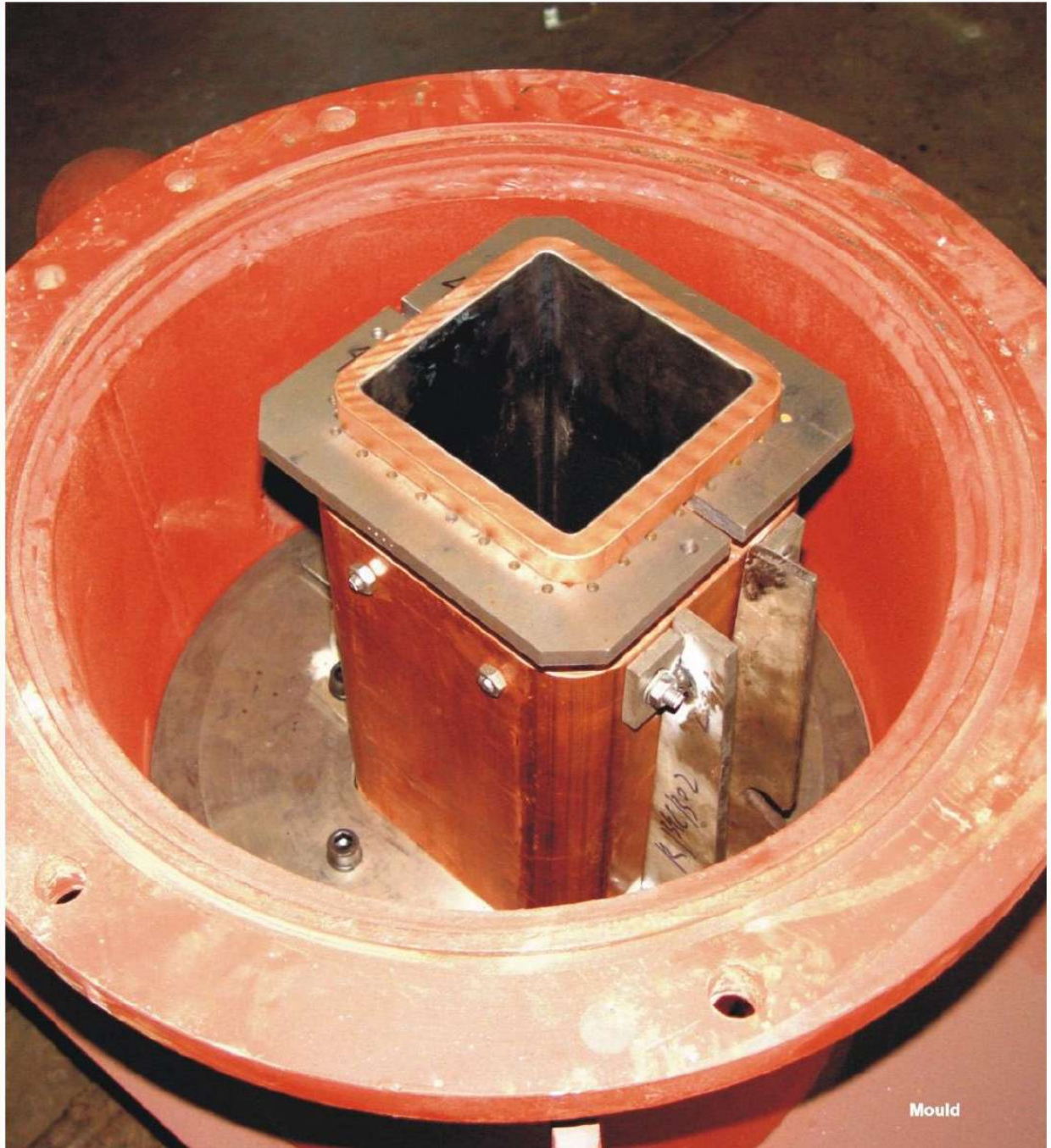
- (1) Mechanical type
- (2) Hydraulic type

### Features:

Flexible moving of manipulator, accurate and transient free positioning.

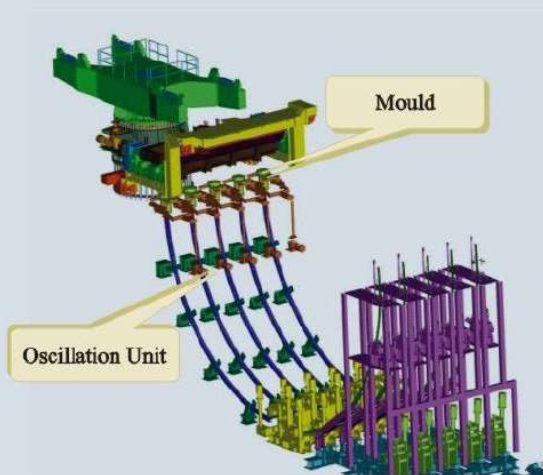
# 13 | Main Equipment

## >> Billet Casting Machine

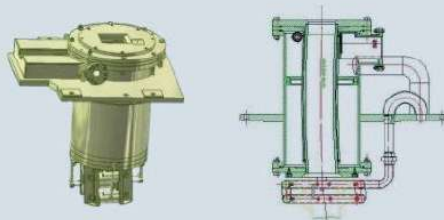


## Main Equipment

## 4. Mould and Oscillation Unit

**(1) Mould****Function:**

The mould removes the initial heat from the molten steel as it is continuously poured into the mould and thus forms the outer shell or skin of the billet. The closed circuit mould cooling or primary cooling water remove the heat transmitted by the liquid steel to the copper tube of the mould during casting.

**(2) Oscillation Unit****Function:**

The mould oscillation unit moves 'up and down' to ensure a uniform growth of the strand shell, to avoid sticking of the shell to the mould and to achieve good surface quality.

**Types:**

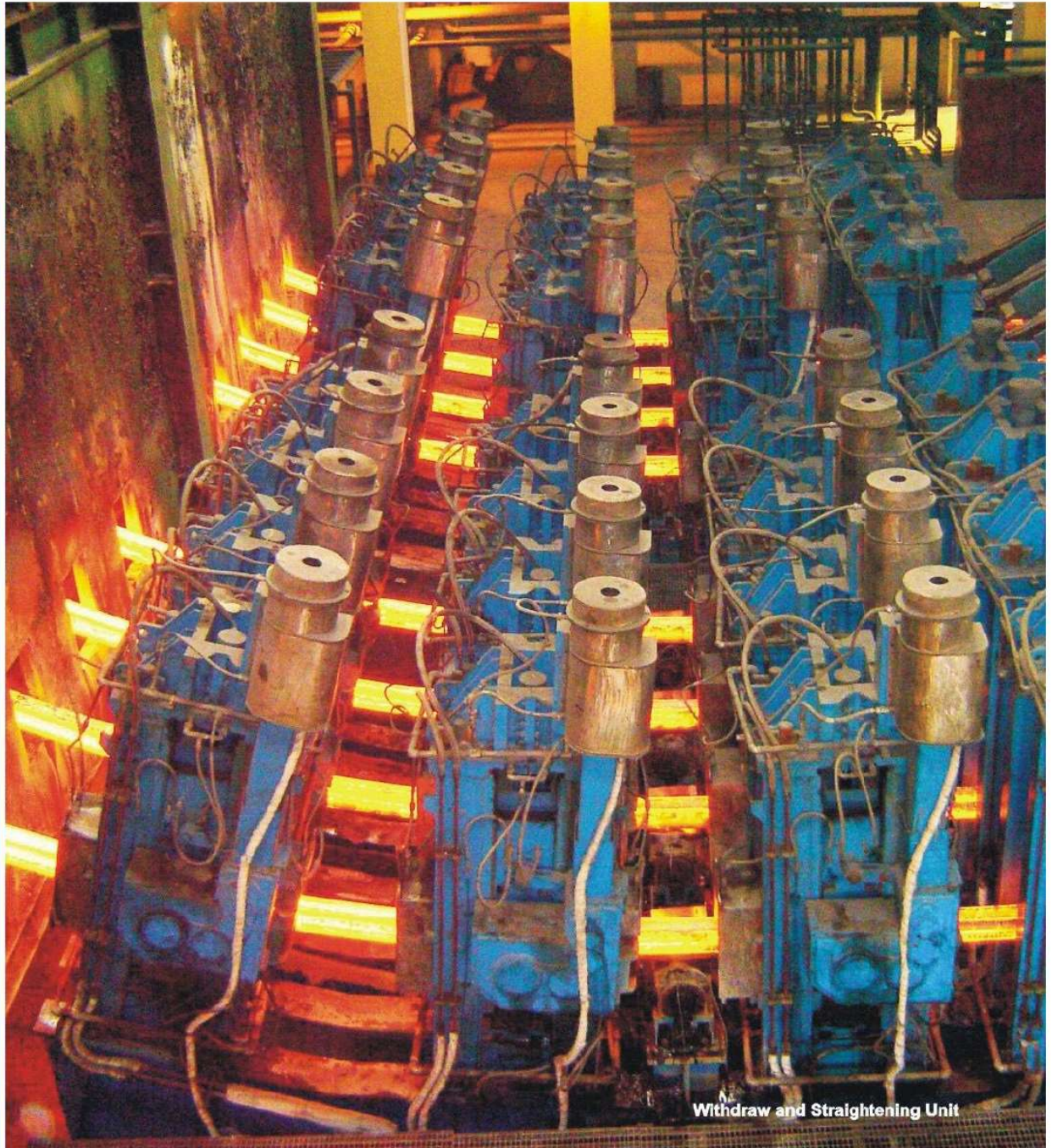
- Mechanical Oscillation Unit
- Hydraulic Oscillation Unit

**Features:**

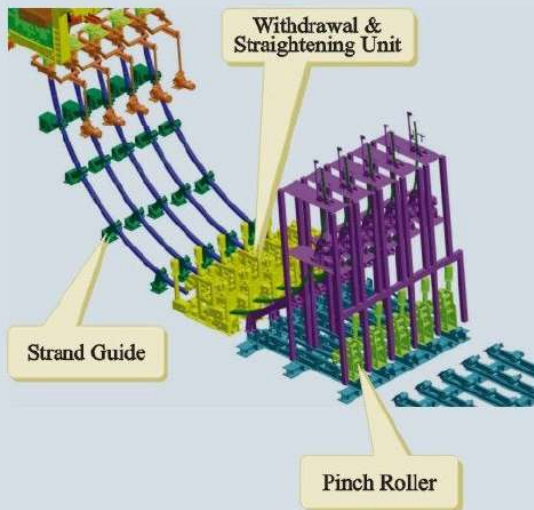
- The mechanical oscillation unit is driven by electrical motor.
  - The hydraulic oscillation unit is driven by hydraulic cylinder.
- The oscillation stroke, frequency and pattern (sinusoidal or non-sinusoidal) can be on-line adjusted.

# 15 | Main Equipment

## >> Billet Casting Machine



## Main Equipment



### 5. Strand Guide Equipment

#### Function:

The strand guide located between mould and withdrawal & straightening unit supports the hot strand during casting, guiding the dummy bar into the mould before casting.

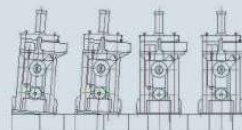
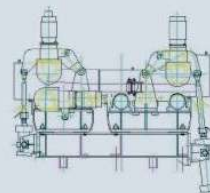
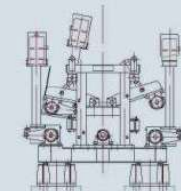
### 6. Withdraw and Straightening Unit

#### Function:

The withdrawal & straightening unit drives the dummy bar into the mould and withdraws the dummy bar / hot strands from the mould. It also straightens the hot strands according to continuous unbending strategy for minimum interface strain rates.

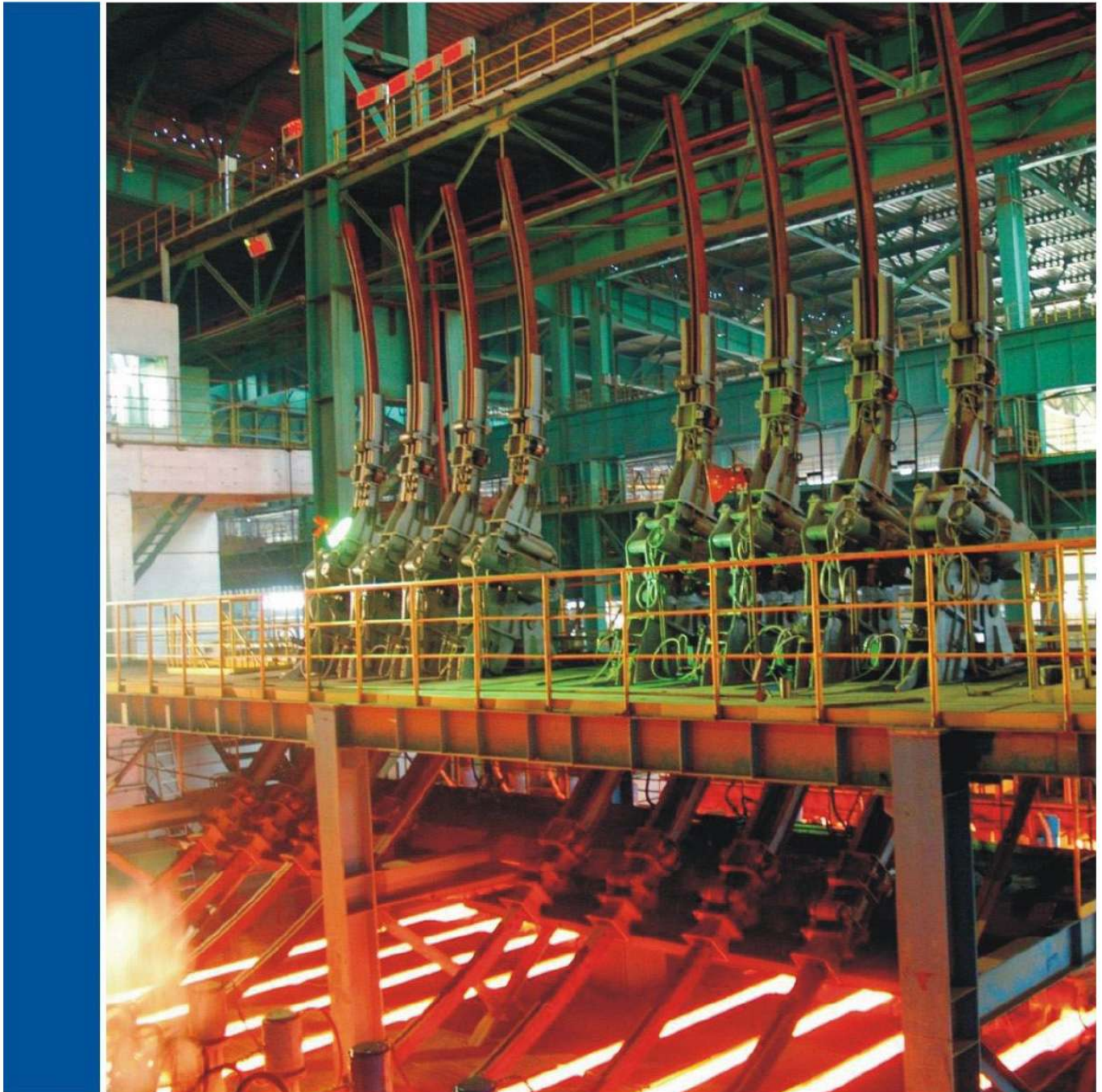
#### Types:

- (1) Whole stand type
- (2) Two-stand type
- (3) Single stand type (for Bloom)

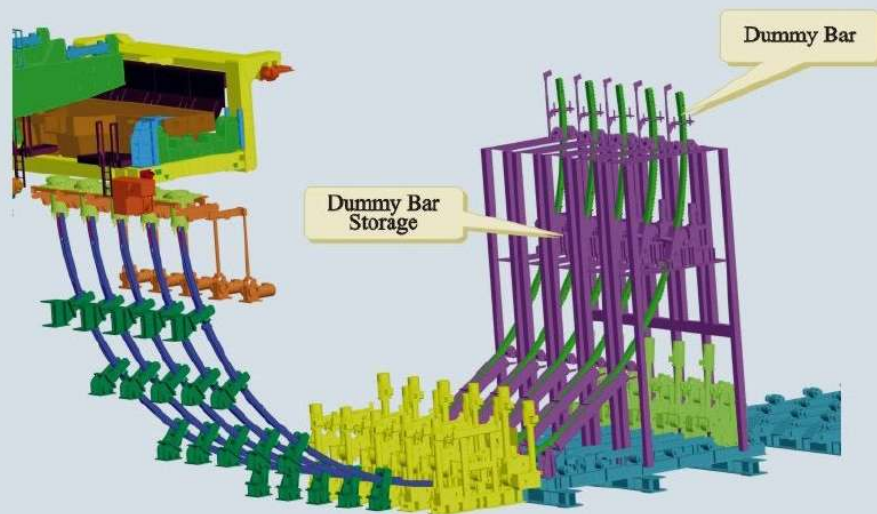


# 17 | Main Equipment

## >> Billet Casting Machine



## Main Equipment



## 7. Dummy Bar System

### (1) Dummy Bar Storage Unit

**Function:**

The dummy bar storage unit consists of a steel structure, along which the rigid dummy bar can be lowered and raised in storage position. When the hot strand connected to dummy bar reaches a certain distance in the straightener, the disconnection of the dummy bar takes place. Then the cast steel can be extracted continuously without the dummy bar which is stored until the next restraining required.

**Types:**

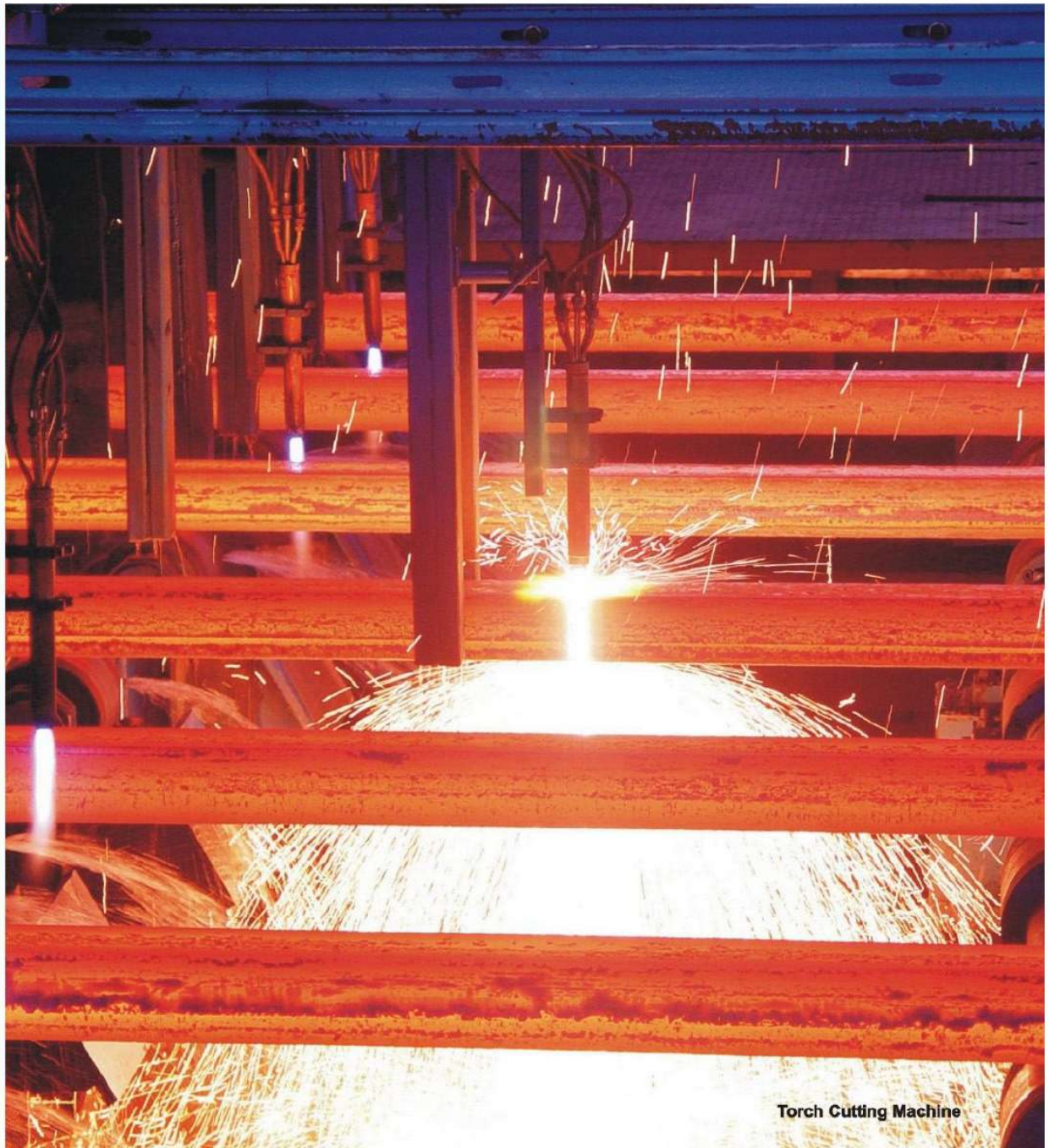
- Fixed Storage Unit
- Tilttable Storage Unit

### (2) Dummy Bar

**Function:**

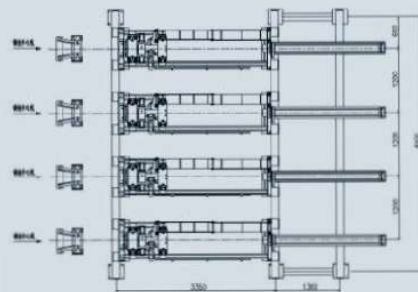
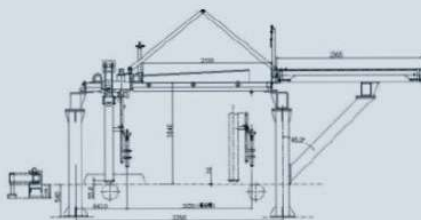
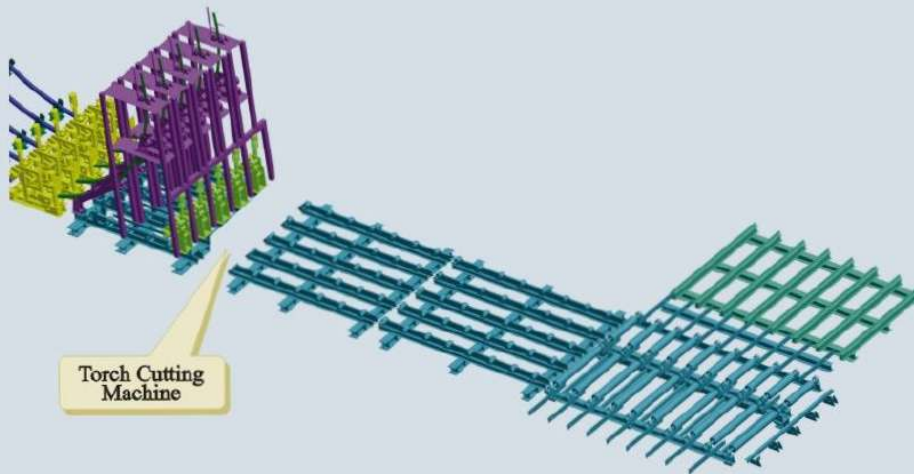
The dummy bar is used to seal the bottom of the mould when each casting begins, in order to pour steel inside it. With the special head shape, the dummy bar is also used to extract the partly solidified steel in the mould down to the withdrawal & straightening unit.





Torch Cutting Machine

## Main Equipment



## 8. Torch Cutting Machine

### Function:

The torch cutting machine cuts the hot strand into billets of required lengths.

### Features:

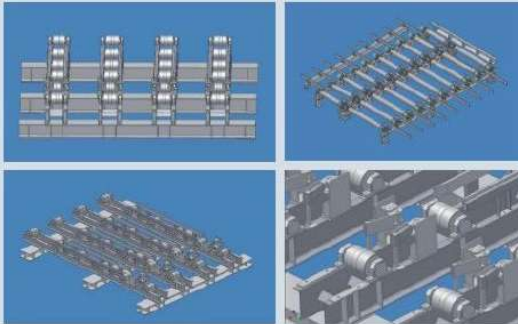
- (1) High cutting speed
- (2) Narrow cutting gap.

## 21 | Main Equipment

### >> Billet Casting Machine



## Main Equipment



### 9. Discharge Equipment

#### (1) Roller Tables

##### Function:

The roller tables consist of torch approach roller table, run-out roller table, discharge roller table etc, which transport the billets onto the discharge system.

#### (2) Movable Stopper

##### Function:

The moveable stop controls the strands to temporarily stop at weighing, stamping, deburring.

#### (3) Lifting Arm

##### Function:

Lifting arm is located on the discharge roller table to transport the billets to the slide rail of discharge roller table.



Moveable Stop



Cross Transfer Car

#### (4) Cross Transfer Car

##### Function:

The cross transfer car moves the billets onto the cooling bed.

#### (5) Cooling Bed

##### Function:

The cooling bed cools the billets. It consists of a steel structure where billets are shifted to the end. The billets are pushed onto the cooling bed from the delivery area of the cross transfer car.

##### Types:

- Grid Cooling Bed (pusher type)
- Turnover Cooling Bed



Grid Cooling Bed (pusher type)

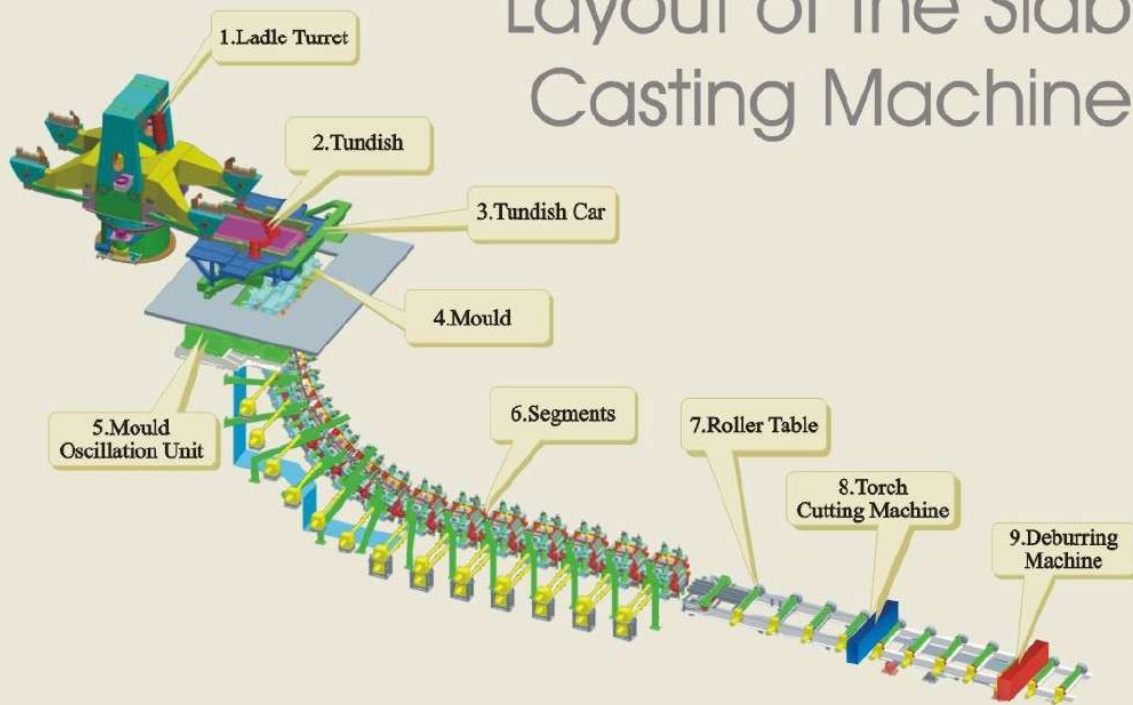


Turnover Cooling Bed



## Main Equipment of Slab Casting Machine

### Layout of the Slab Casting Machine



#### Main Equipment of Slab Casting Machine:

- |                           |                          |
|---------------------------|--------------------------|
| 1. Ladle Turret           | 6. Segments              |
| 2. Tundish                | 7. Roller Table          |
| 3. Tundish Car            | 8. Torch Cutting Machine |
| 4. Mould                  | 9. Deburring Machine     |
| 5. Mould Oscillation Unit | 10. Dammy Bar & Storage  |

## Main Equipment

## 1. Mould and Oscillation Unit

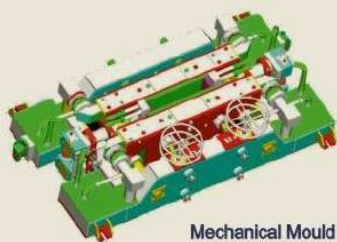
### (1) Mould

**Function:**

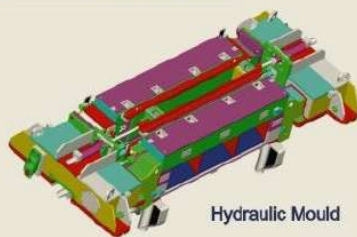
Mould is the core equipment of caster where solidification takes place.

**Types:**

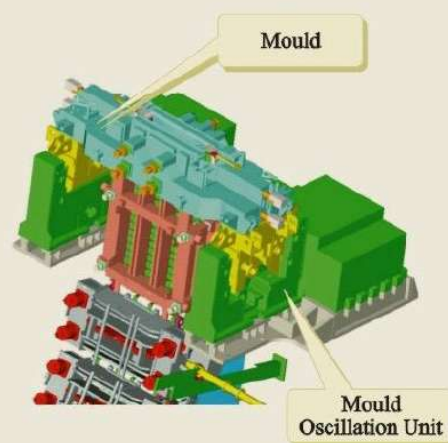
- Mould with mechanical adjustment device
- Mould with hydraulic adjustment device



Mechanical Mould



Hydraulic Mould



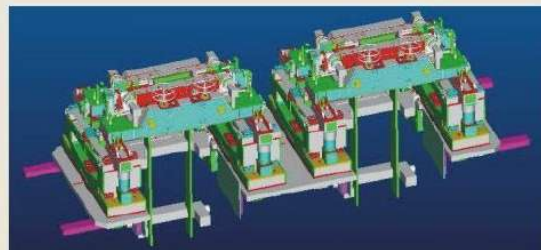
### (2) Oscillation Unit

**Function:**

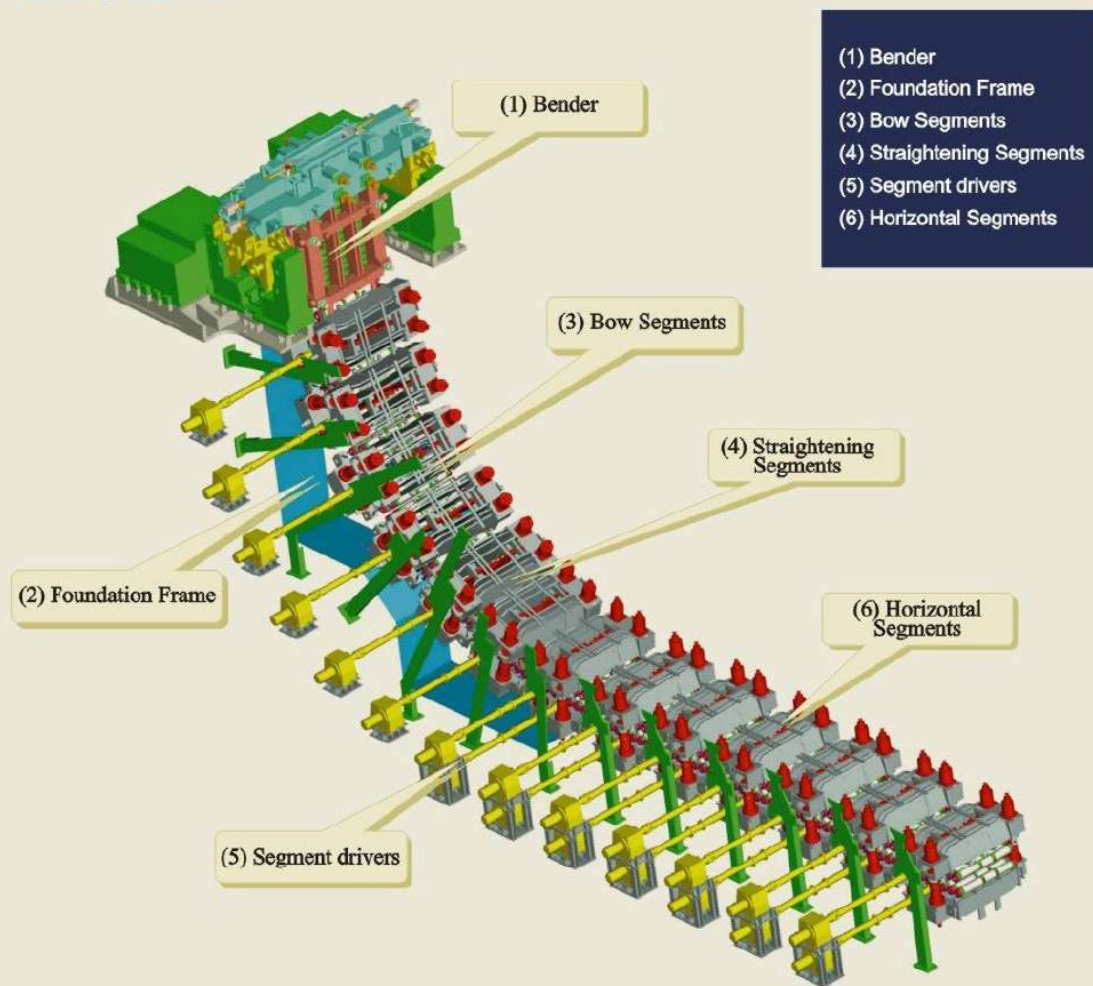
The mould oscillator provides the necessary movement of the mould to prevent the strand shell from sticking to the copper plate.

**Types:**

- Mechanical Oscillation Unit
- Hydraulic Oscillation Unit



## 2. Segments

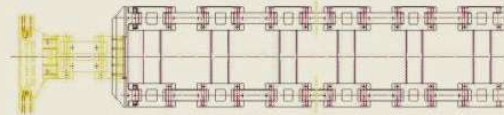


### 3. Dummy Bar Equipment

#### (1) Dummy Bar

**Function:**

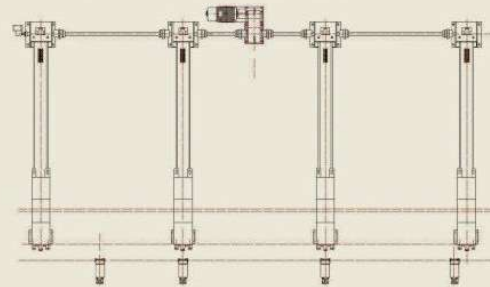
Dummy bar serves to seal the mould before the casting begins and to draw the hot strand head.



#### (2) Dummy Bar Storage Device

**Function:**

It stores dummy bar in storage position.



#### (3) Centering Device

**Function :**

It centralizes dummy Bar on the roller table in order to line-up with the mould.



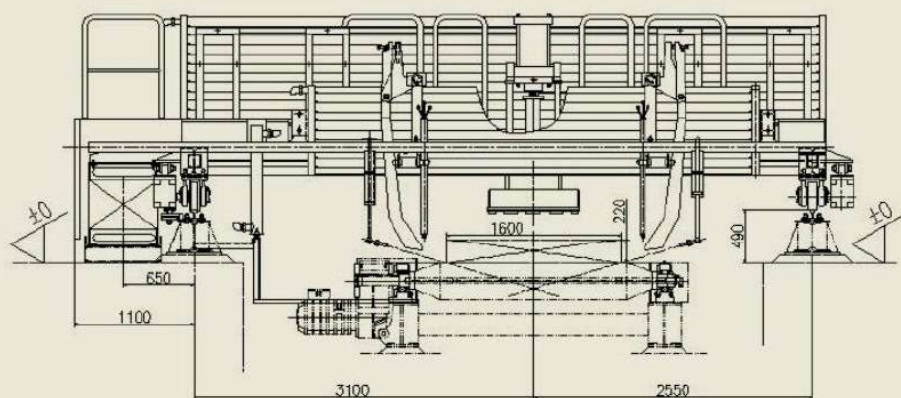
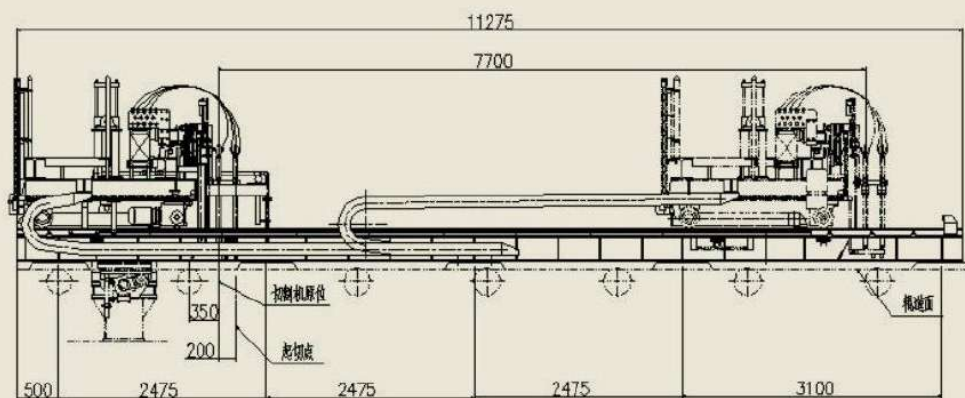
Dummy Bar Equipment of Slab Casting Machine

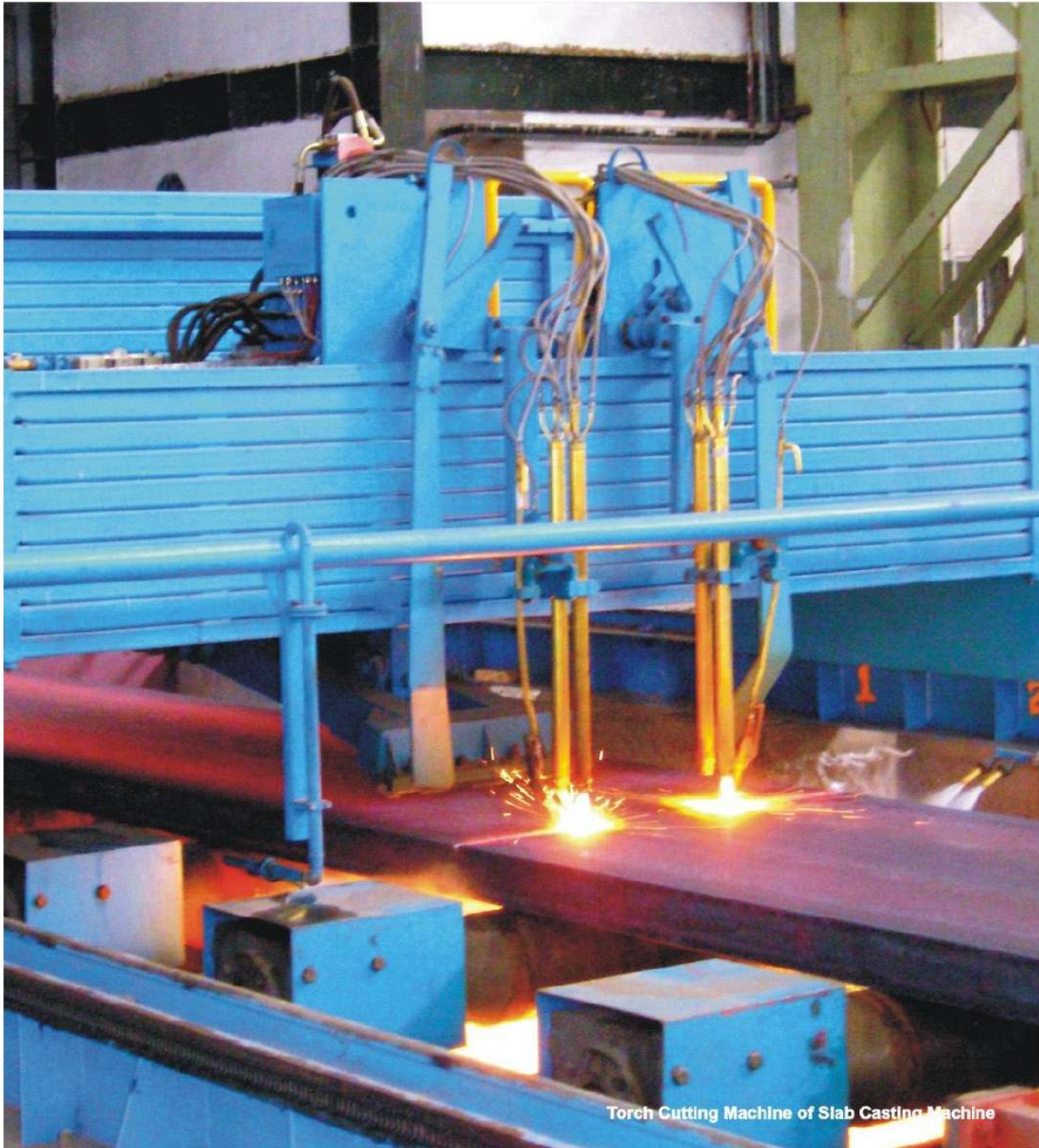
## Main Equipment

### 4. Torch Cutting Machine

**Function:**

The torch cutting machine is a main equipment of a continuous caster. It cuts slabs into the required length.

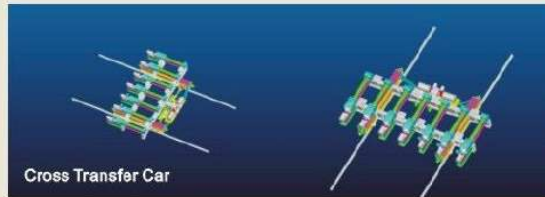
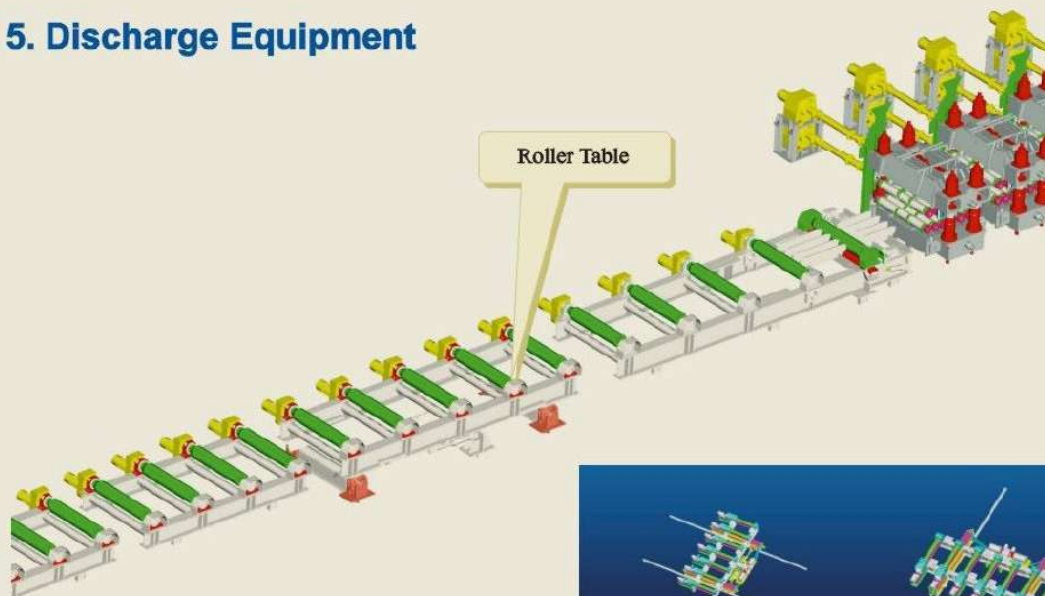




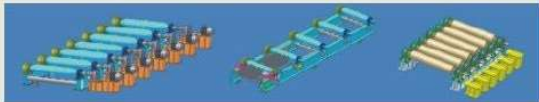
Torch Cutting Machine of Slab Casting Machine

## Main Equipment

## 5. Discharge Equipment

**(1) Roller Tables****Function:**

The roller tables transport the slabs down to the discharge area.

**(2) Cross Transfer Car****Function:**

Cross transfer car serves for receiving the slabs coming from strand and transporting them down to the next roller table.

**(3) Turntable Device****Function:**

The turntable device turns and transports the slabs to next roller table and required position.

**(4) Piler & Pusher**



Discharge Equipment of Slab Casting Machine

## Main Equipment of Strip Processing Line

### 1. Strip Cleaning Equipment





Looper



Looper



Looper

## 2. Looper

### 3.Tension Coiler





Tension Coller



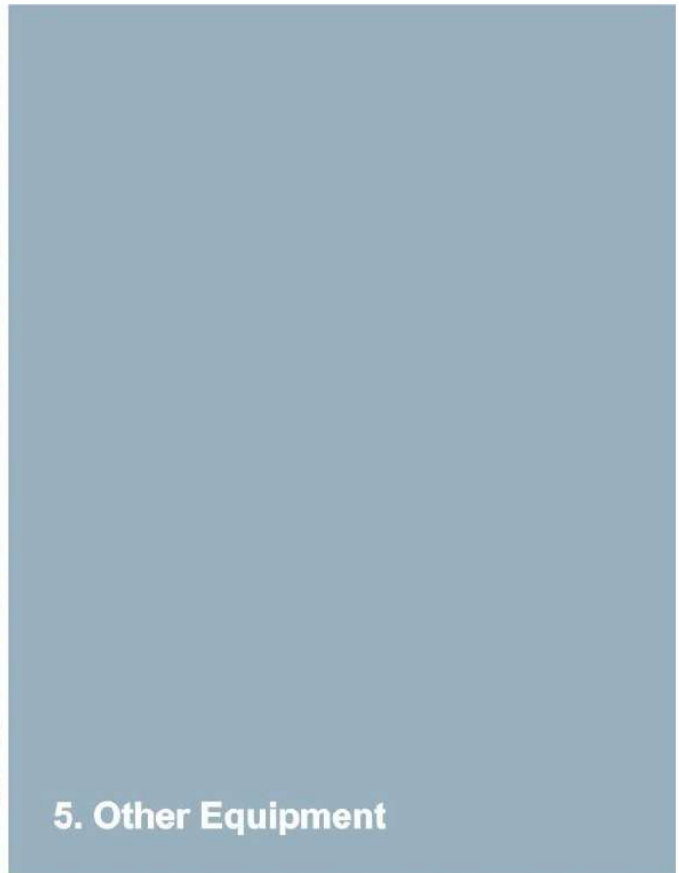
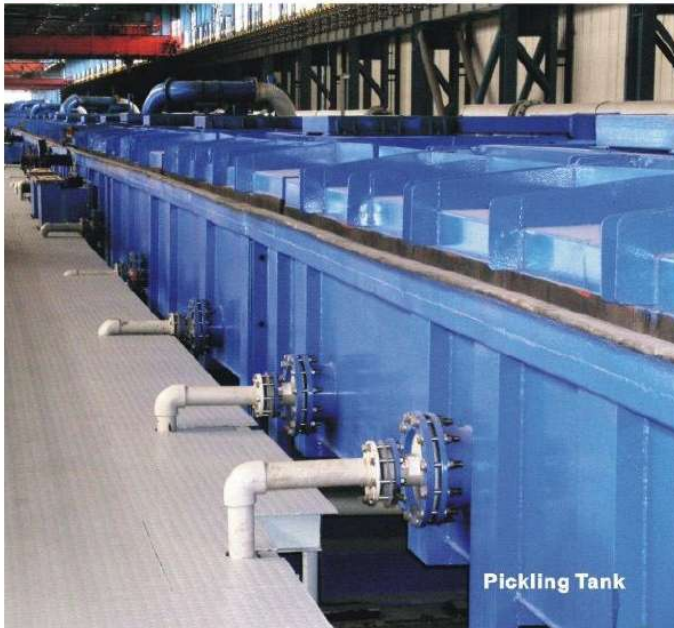
#### 4. Oven





## 5. Other Equipment

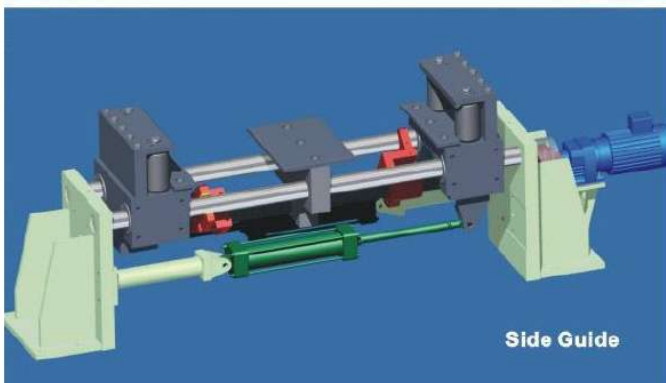
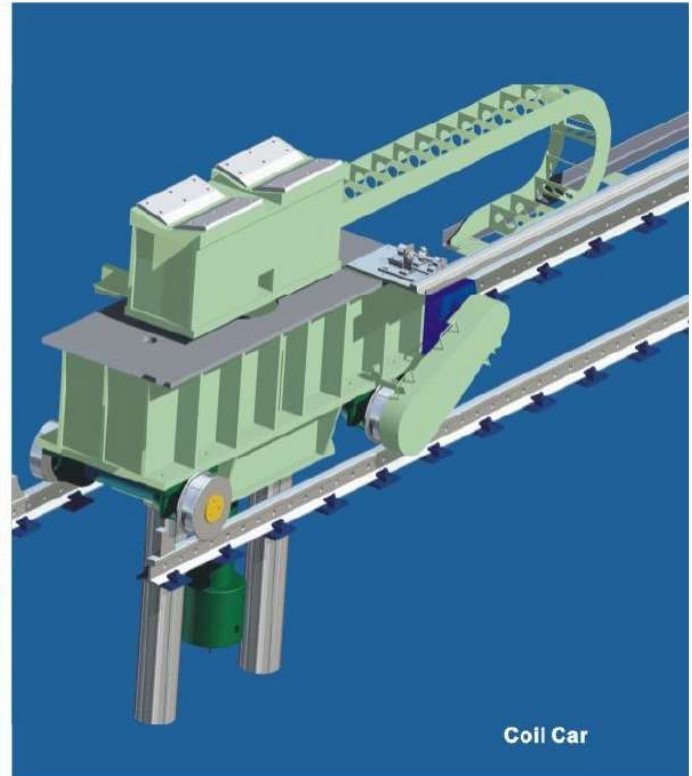






## 5. Other Equipment





## 5. Other Equipment

## Automation System



Main Control Room



Electrical Equipment Manufacturing

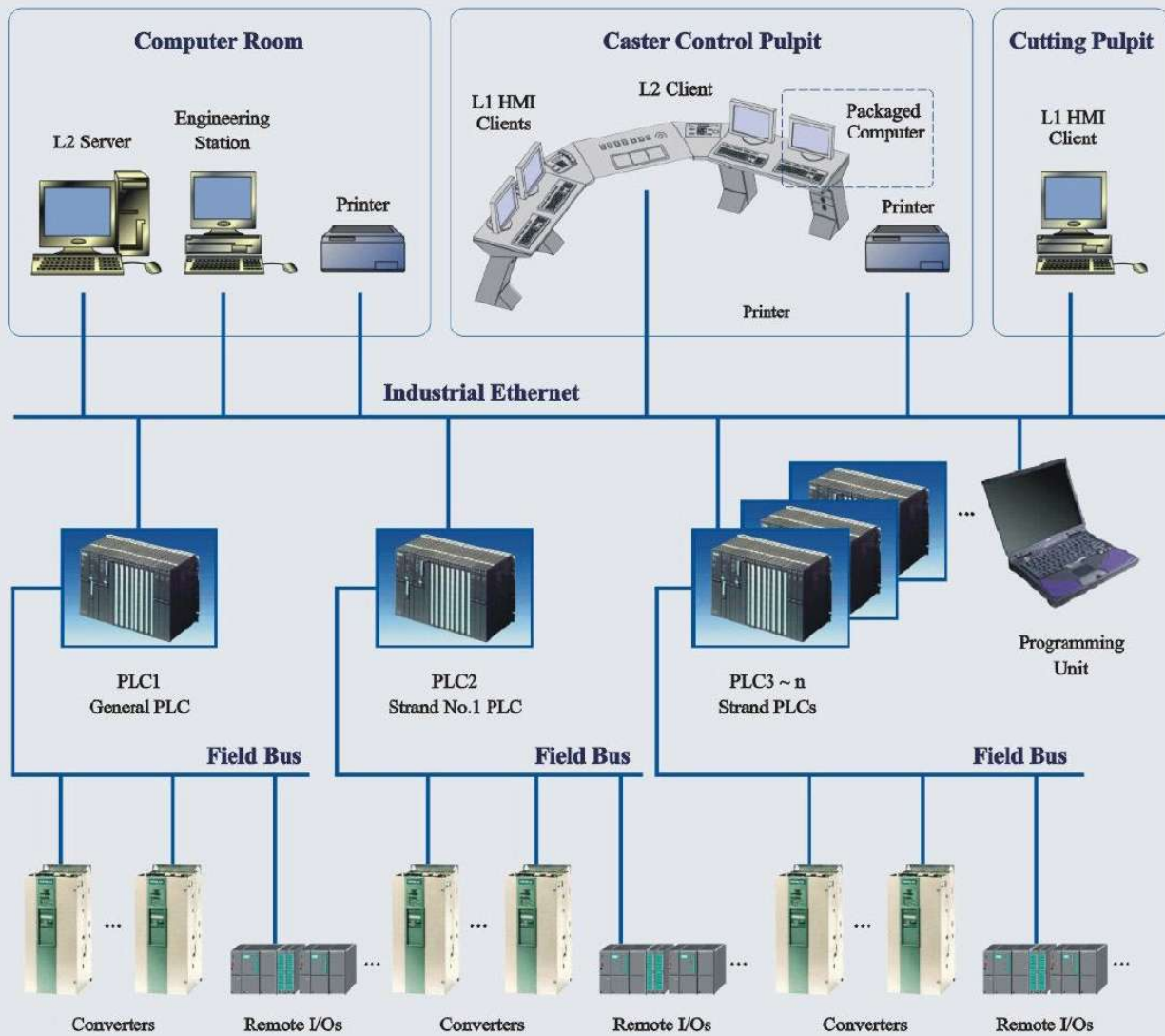


Control Desk

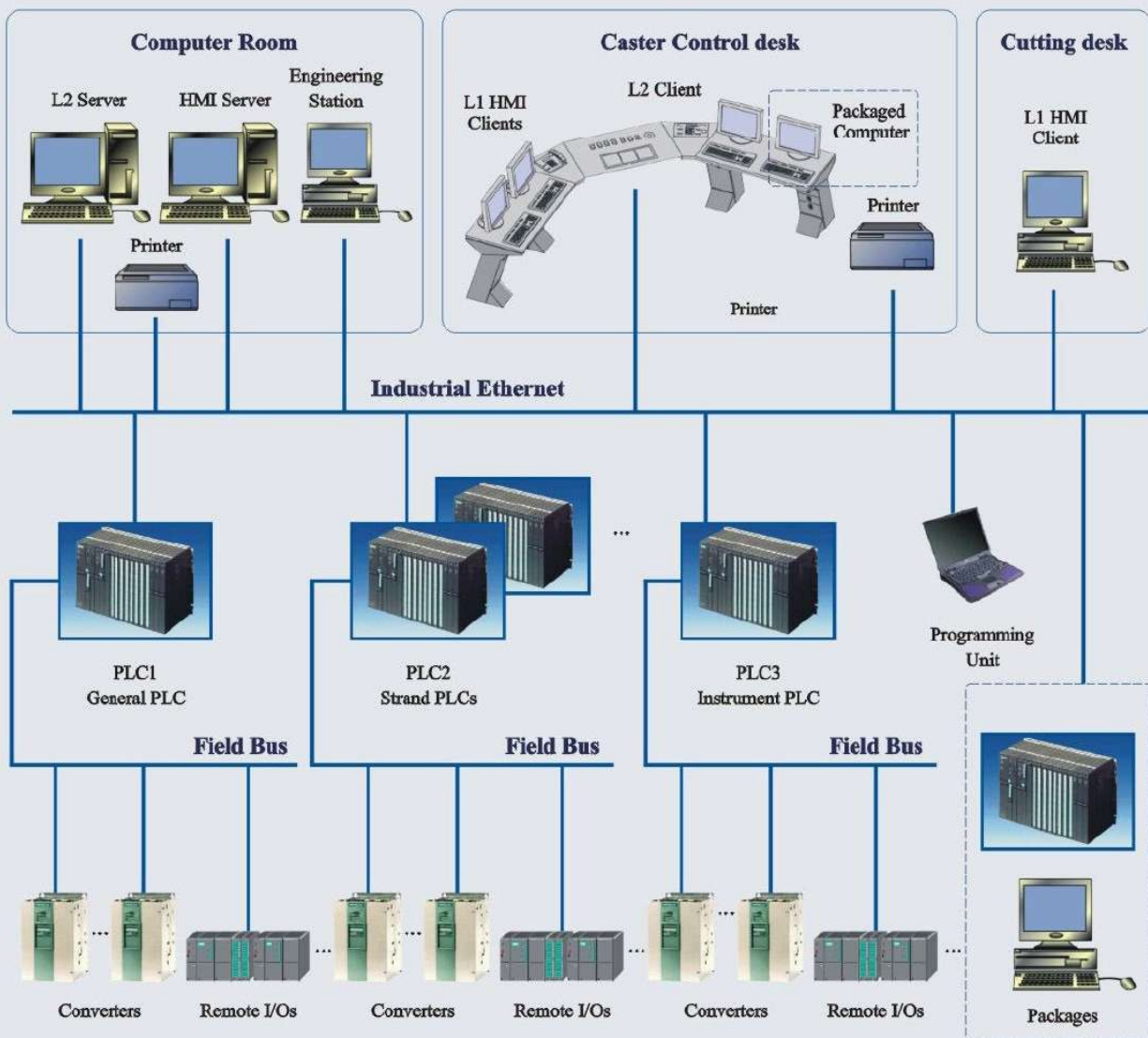


Training

Automation System for Billet Caster



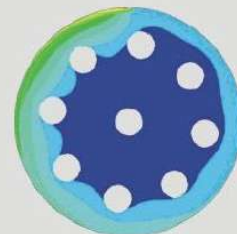
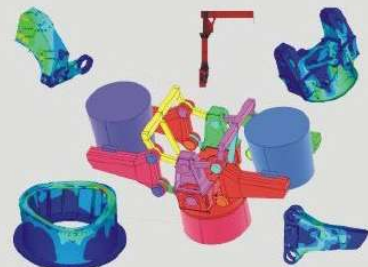
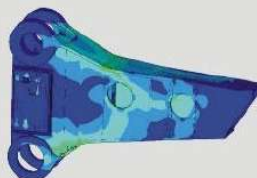
# Automation System for Slab Casting Machine



# Core Technologies

Continuous Casting

Strip Processing



## Continuous Casting

### 1. Mould design

#### (1) Tube mould, Mould Water Jacket and High Performance Mould

**Tube Mould** (Patent No. ZL 96 2 41495.6)

Special-designed parabola taper for Mould's cavity corresponds to the shell solidification curve of the billet, which can reduce the air gap and enhance thermoconductivity.

**Water Jacket for Mould** (Patent No. ZL 00 2 33390.2)

Provide even water stream for better cooling effect, which can improve billet's quality effectively.



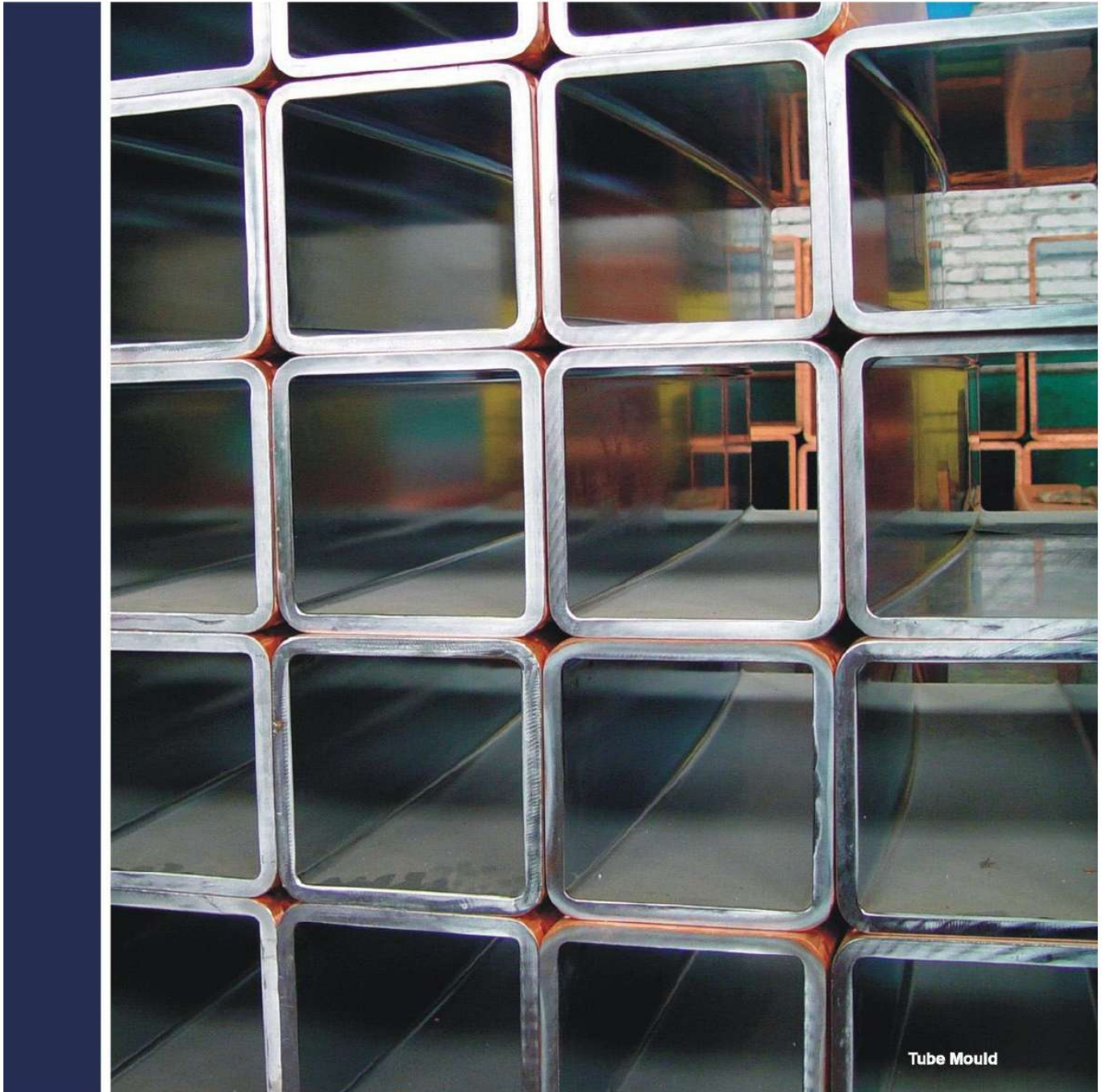
**High Performance Mould** (Patent No. ZL2005200087957)

It is able to produce various billets, in terms of sections, and through the attached MEMS system, it can save the energy consumption by 10%~20%.

#### (2) Mould Copper Plate

CCTEC's mould copper plate for slab caster is made of alloy consisting of Copper, Chromium and Zirconium, which has excellent performance in production. The features of the slab mould are as follows.

- Better tensile strength & hardness , high softening temperature
- Good abrasive resistance and thermoconductivity
- Better mechanical and physical property than Copper-Silver or Copper-Phosphor mould

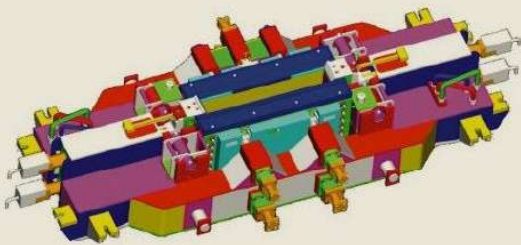


Tube Mould

## 2. Hydraulic Oscillator

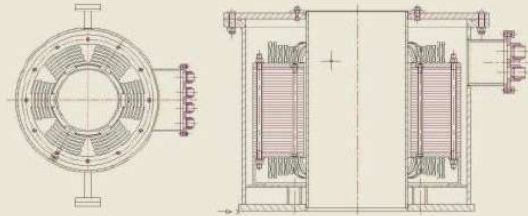
CCTEC's hydraulic oscillator can improve casting products' quality to extremely high level with the following features.

- (1) Oscillation amplitude and frequency can real time changespeed in terms of setting curve. With continuous change of withdraw speed, it can ensure the correct negative strip time.
- (2) Supply oscillation mode of sinusoid and non-sinusoid curve respectively with online switch function, and present deflection rate ranging from 20% to 80% (50% of which are sinusoid).
- (3) By adopting the position feedback control model, we have compensated the synchronization error. So it does not require high mechanical installation precision, and it is easy to maintain.
- (4) Supply HMI(human-machine interface) image in the full process of monitoring, operation and adjustment, which electric engineer to run and maintain equipment easily.
- (5) Oscillator range can vary from -5mm to +5mm.
- (6) Synchronizing precision can reach 50um.



## 3. Electromagnetic Stirring Technology

The practice of continuous casting has proven that steel flow control in the mould is a very effective way to improve the billet quality and caster's productivity.



**CCTEC's MEMS (Mould Electromagnetic Stirring) based on the travelling magnetic field, is an important steel flow control mode, features of which are as follows:**

- There are 2 travelling magnetic field stirrers installed respectively on the 2 wide sides of the mould, which can activate the magnetic field with reverse direction. Then, the liquid steel will be effectively controlled by whirling under the effect of electromagnetic force.
- CCTEC's MEMS can effectively improve the quality of steel products.
- It is able to reduce the bubble defects by 60% both of the surface and inner billet.
- By supplying more cleaning slab with lessened inner inclusion, it can reduce the condemned factor of flat products by 67%, and condemned quantity of the steel strip by 50%.

## 4. Dynamic Soft Reduction

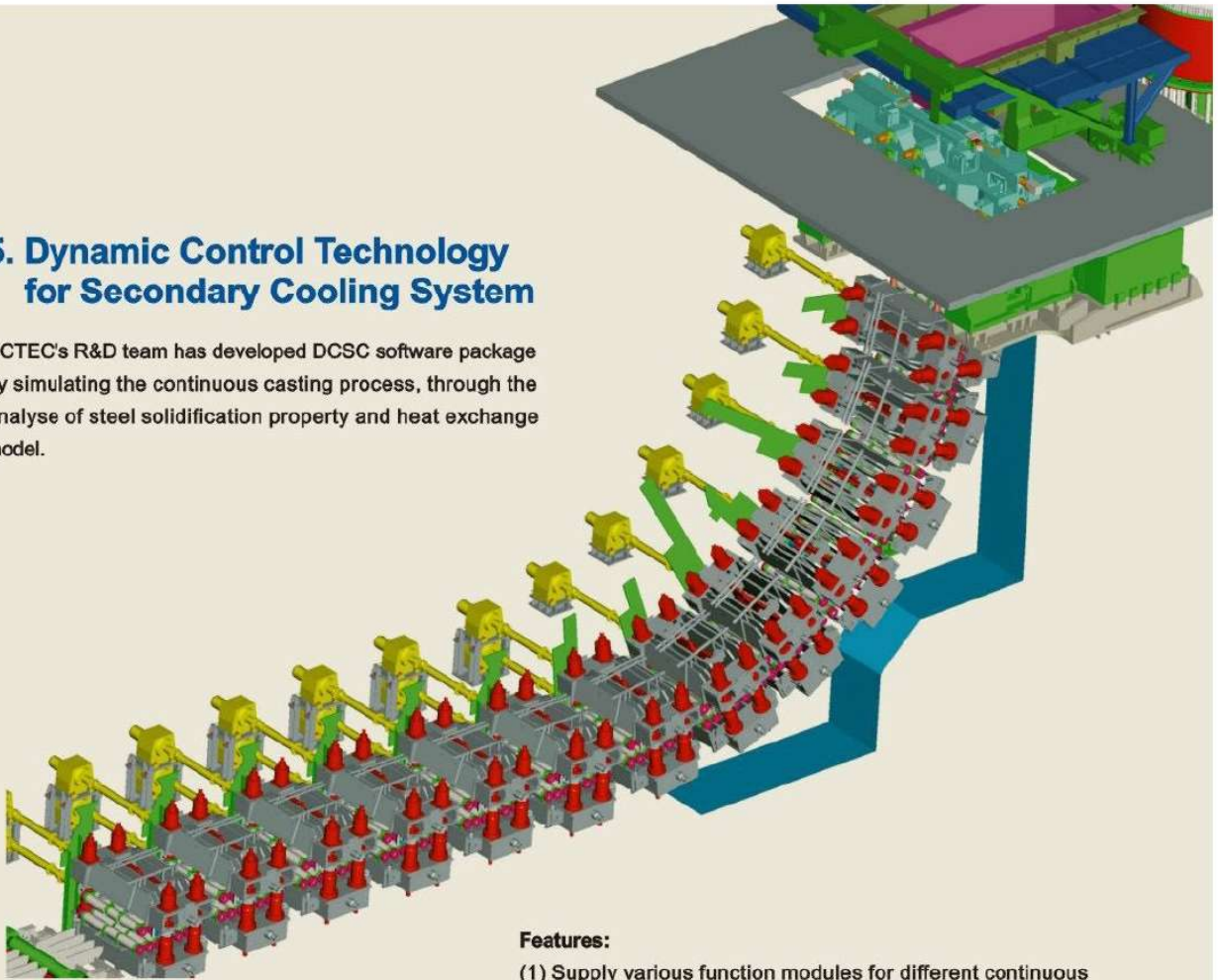
Center segregation and porosity are the common defects to the processed steel under the regular continuous casting process. It would impact the metal's ductility, welding performance and reduce the resistance to hydrogen-caused crack.

Dynamic Soft Reduction (DSR) technology is a latest achievement developed by CCTEC, which can effectively reduce the above-mentioned defects. DSR system consists of Dynamic Tracking Model and Dynamic Controlling Mold.



## 5. Dynamic Control Technology for Secondary Cooling System

CCTEC's R&D team has developed DCSC software package by simulating the continuous casting process, through the analyse of steel solidification property and heat exchange model.



### Features:

- (1) Supply various function modules for different continuous casters in terms of automation setup; simulate simulate the solidification process of continuous casting
- (2) Calculate the surface temperature of processed steel.
- (3) Optimize the process of secondary cooling water distribution
- (4) Achieve dynamic distribution of secondary cooling system by real-time calculations for cooling water distribution

# Strip Processing

## 1. New type of Strip Tension Leveler (Patent No. : ZL 2005 2 0095272.0)

This Strip Tension Leveler consists of 2 groups of bending unit and 1 group of leveling unit.

### Features:

- (1) Reduce yield point when strip is stamped.
- (2) Improve ductility and deformation range of tensile strength by reducing yield point.
- (3) Raise the flatness and reduce the surface roughness of strip
- (4) By wet leveling, we improve the surface quality of strip and extend the working life of roller group.
- (5) Easy to operate and maintain. Each roller unit can be quickly pressed and released. Roller position can be preset according to process requirements.
- (6) Replace the bending roller group and leveling roller unit quickly in the process of production with the independent roller changer.

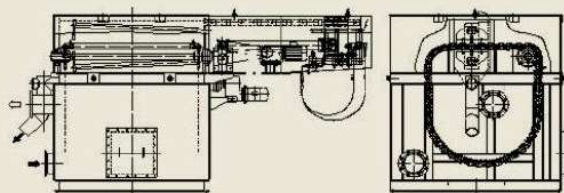


## 2. Chain-type Magnetic Filter (Patent No. : ZL2004 2 0111504.2)

CCTEC's new chain-type magnetic filter consists of tank, bar magnet chain with scraper device, collecting tank for ferrous powder and drive unit.

In the process of production, this device can extend the working life of emulsion or cleaning liquor by separating the impurity of ferrous powder and recycling the filtrated such liquid. The isolated ferrous powder will be collected for useful disposal.

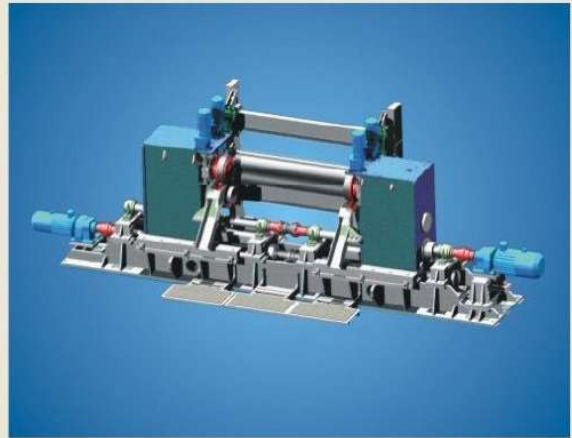
With dependable quality, simple structure, low demand of process water and low use-cost, CCTEC's new chain-type magnetic filter can provide an excellent performance in actual production.



### 3. Side Trimmer

**Features:**

- (1) This equipment has 2 groups of knife disc systems for automatic setting for the opening width, which has a mode switch to control the cut and draw cut via the overrunning clutch according to different process requirements.
- (2) According to different trimming requirements of various strips, Shearing knives precisely automatic setting.
- (3) With a CPC unit at entry side of the side trimmer, the recovery factor can be improved effectively by reducing trimming quantity.

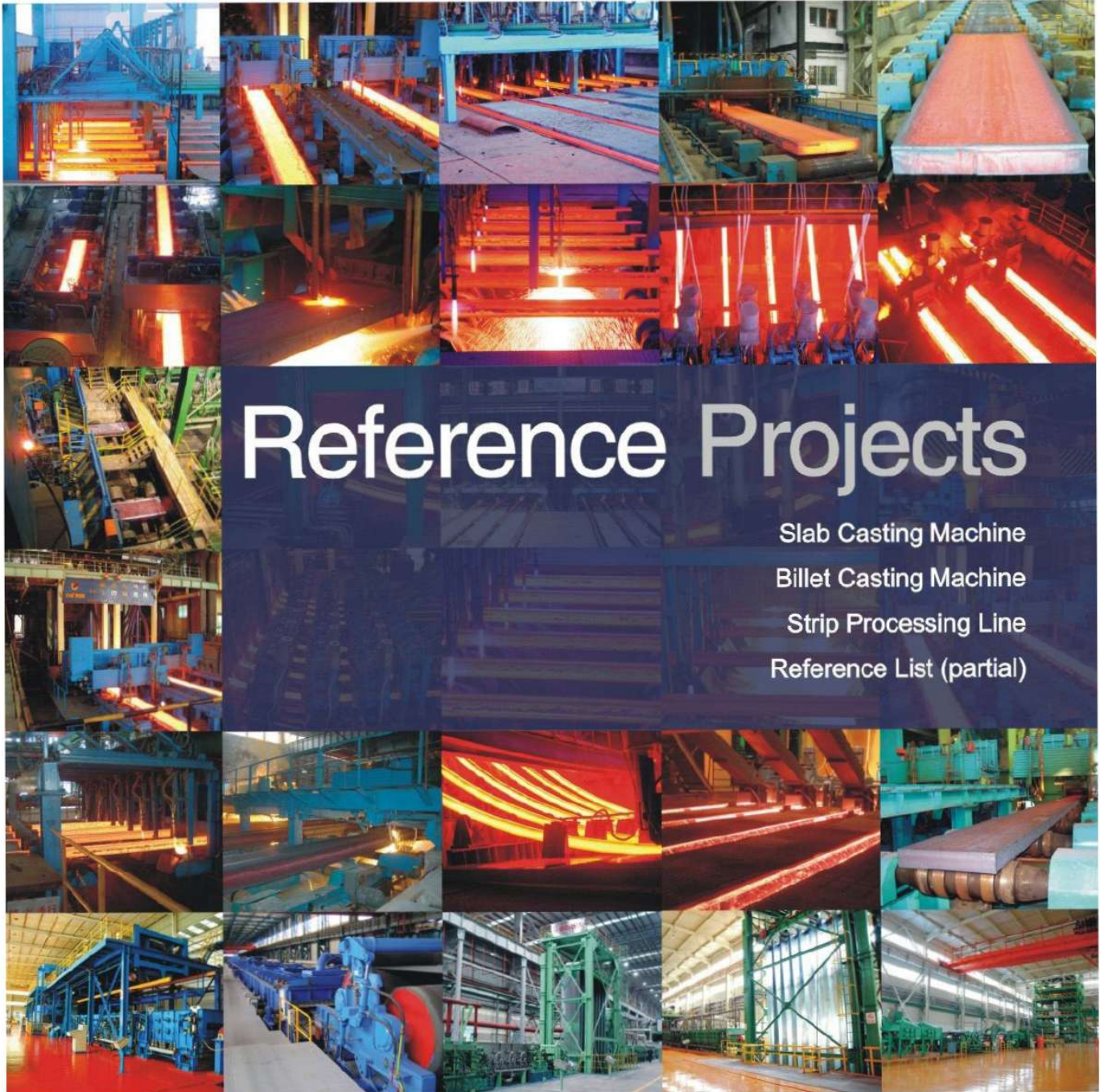


### 4. Fresh hot air oven and Incineration process for Color Coating Line

CCTEC's fresh hot air oven and incineration process can ensure the clean surface and good coating quality of the strip steel with the following features.

- (1) Burn out impurities fully without air pollution emission
- (2) Save fuel by recycling the heat from impurities burning
- (3) Easy to operate and maintain with automation control system





# Reference Projects

Slab Casting Machine

Billet Casting Machine

Strip Processing Line

Reference List (partial)

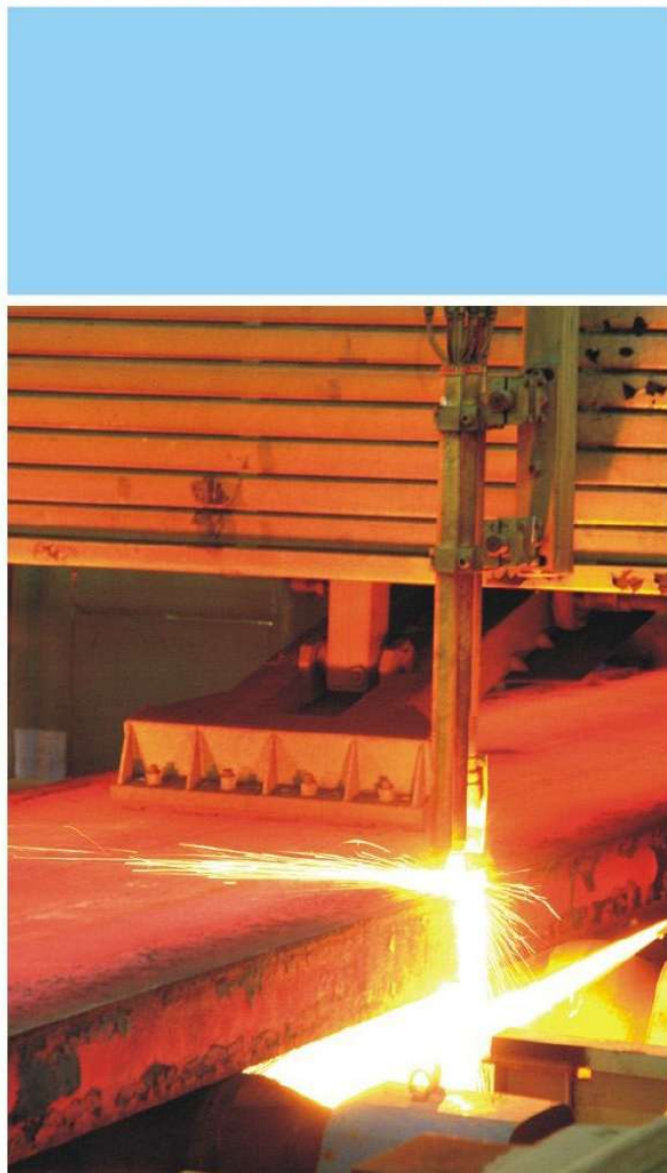


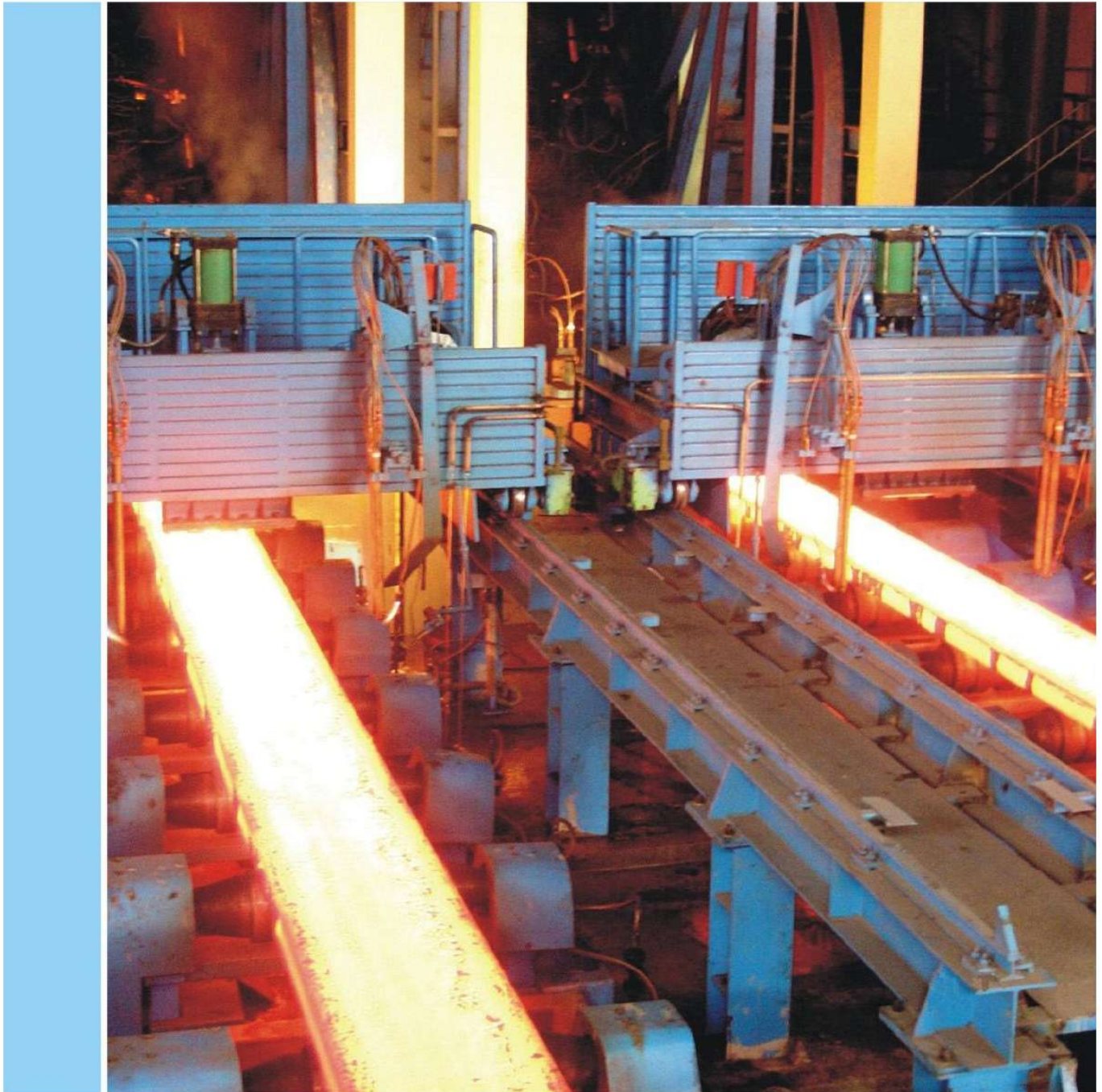
## Slab Casting Machine

### 1. Single-strand slab casting machine for Handan I&S company

#### Features:

Annual Capacity	1,000,000t/a
Steel Grade	Carbon steel, low alloy, bridge steel, pressure vessel steel, boiler steel, middle carbon steel
Caster Radius	10 m
Strand Number	1
Section Size (mm)	180、220、250×1400~1900
Type of Equipment	Vertical-curved type caster, Chain type dummy bar
Put into Production	September,2005
Remarks	Turnkey contract (EPC)

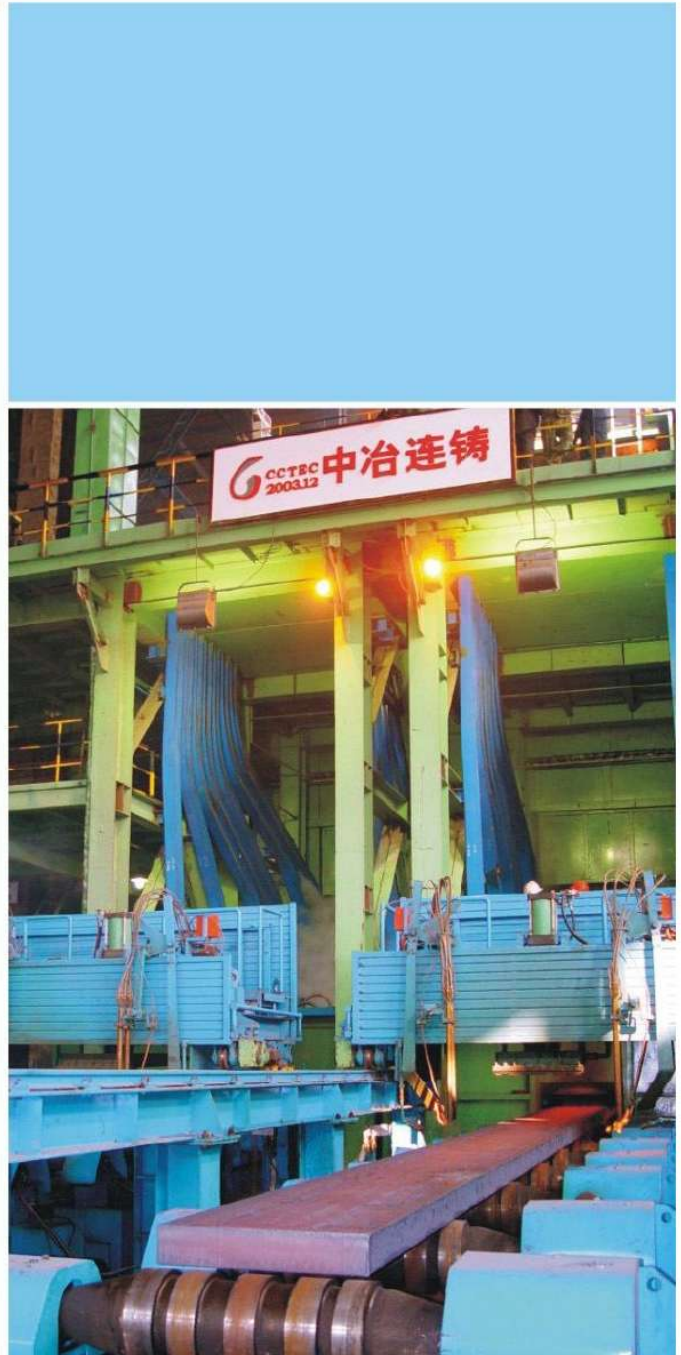




## 2. 2-strand slab casting machine for Lingyuan I&S company

### Features:

Annual Capacity	900,000t/a
Steel Grade	Carbon steel, low alloy steel, spring steel, pipeline steel
Caster Radius	7 m
Strand Number	2
Section Size (mm)	150, 160×400~750
Type of Equipment	Vertical-curved type caster, Chain type dummy bar
Put into Production	October, 2005
Remarks	Turnkey contract (EPC)

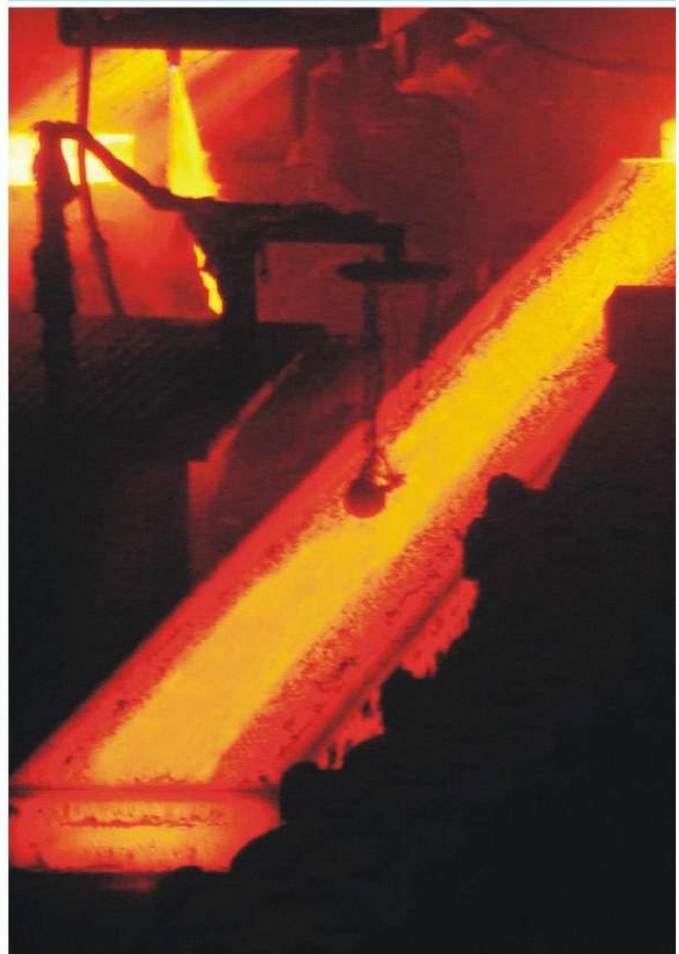




### 3. 3-strand slab (flat blank) casting machine for Baotou I&S company

#### Features:

Annual Capacity	600,000t/a
Steel Grade	High quality carbon steel, low alloy steel, plain steel
Caster Radius	6 m
Strand Number	3
Section Size (mm)	125x285, 125x360, 125x435
Type of Equipment	Vertical-curved type caster
Put into Production	December, 2003
Remarks	Turnkey contract (EPC)



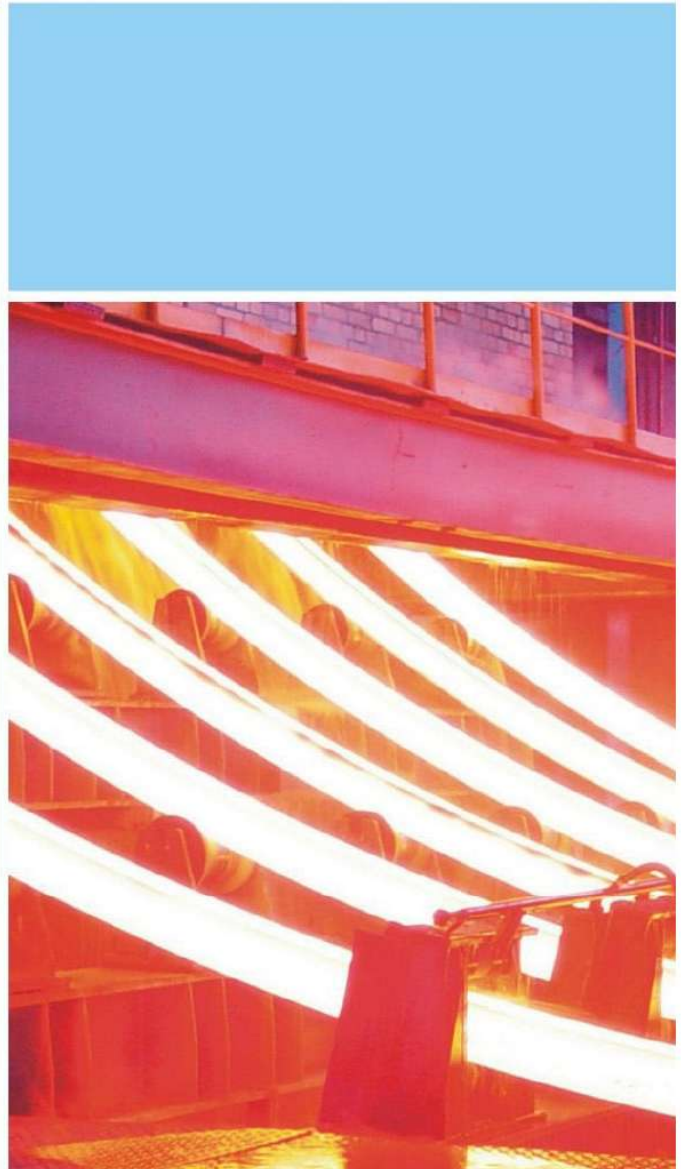


## Billet Casting Machine

### 1. 6-strand billet casting machine for Qingdao I&S company

**Features:**

Annual Capacity	900,000t/a
Steel Grade	Welding Rod steel, high quality carbon steel, spring steel
Caster Radius	9 m
Strand Number	6
Casting speed	1.2~3.0 m/min
Section Size (mm)	150x150, 180x220
Type of Equipment	Curved type
Put into Production	October, 2004
Remarks	Turnkey contract (EPC)

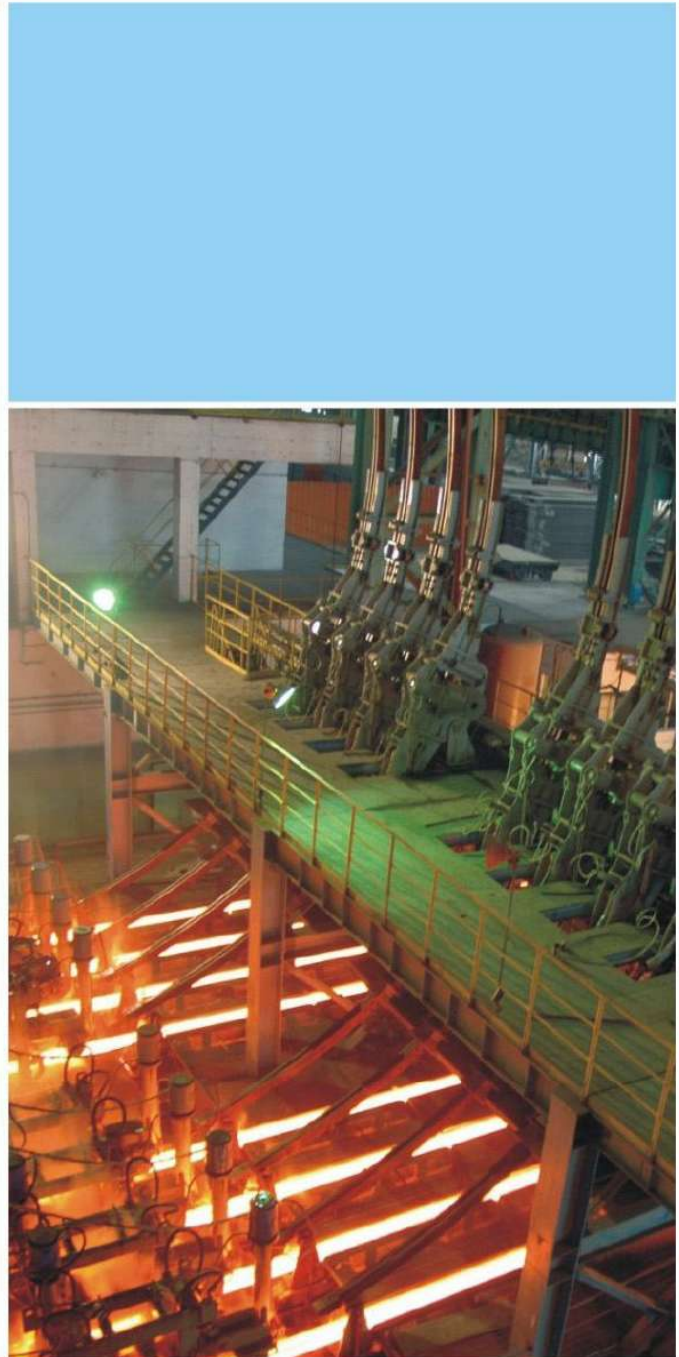


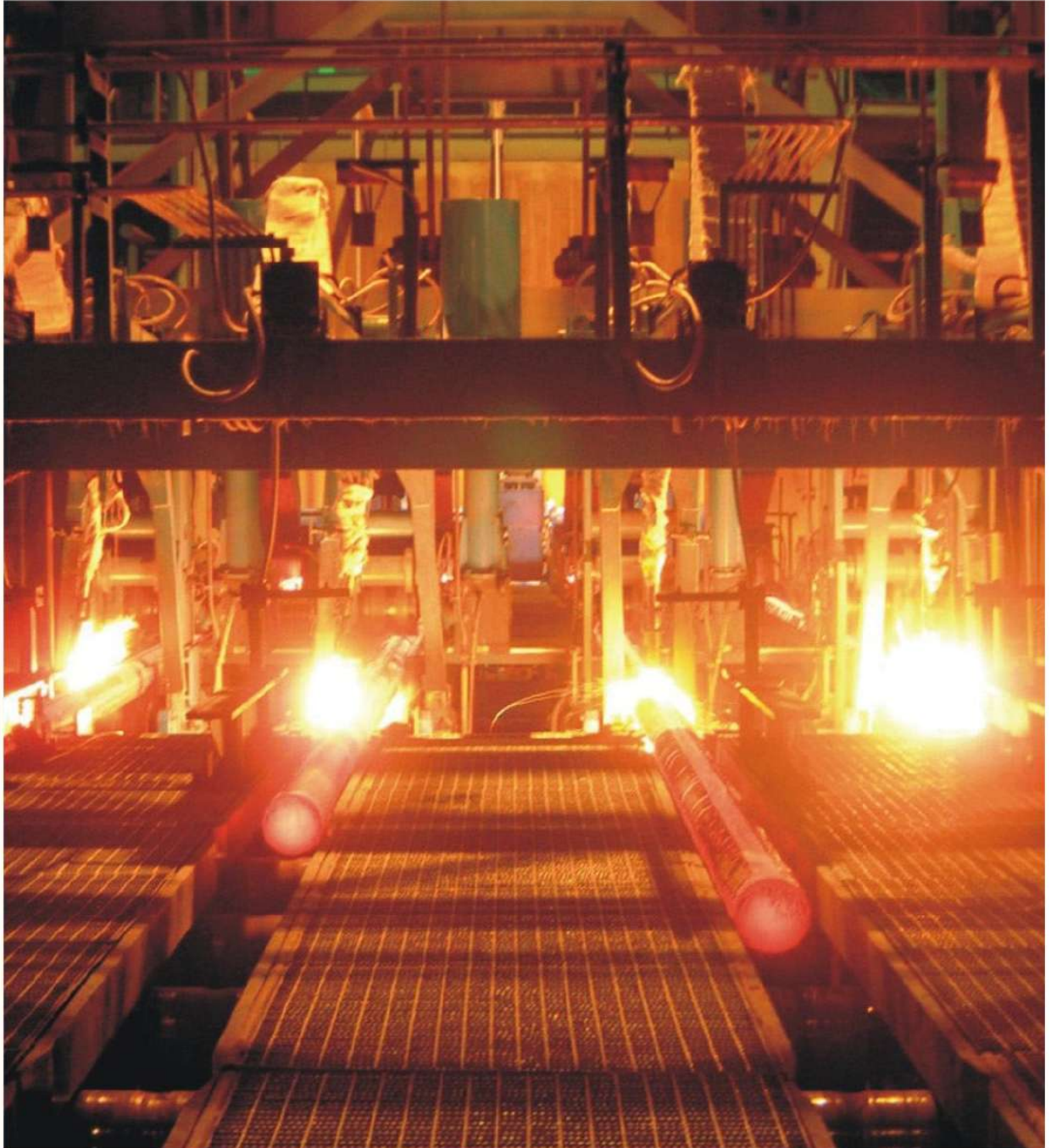


## 2. 8-strand billet casting machine for Beiyang I&S company

### Features:

Annual Capacity	1,500,000t/a
Steel Grade	Carbon structural steel, high quality carbon structural steel, low alloy structural steel
Caster Radius	9m
Strand Number	8
Casting speed	2.0~3.5 m/min
Section Size (mm)	150x150, 135x135, 120x120
Type of Equipment	Curved type
Put into Production	October, 2006
Remarks	Turnkey contract (EPC)

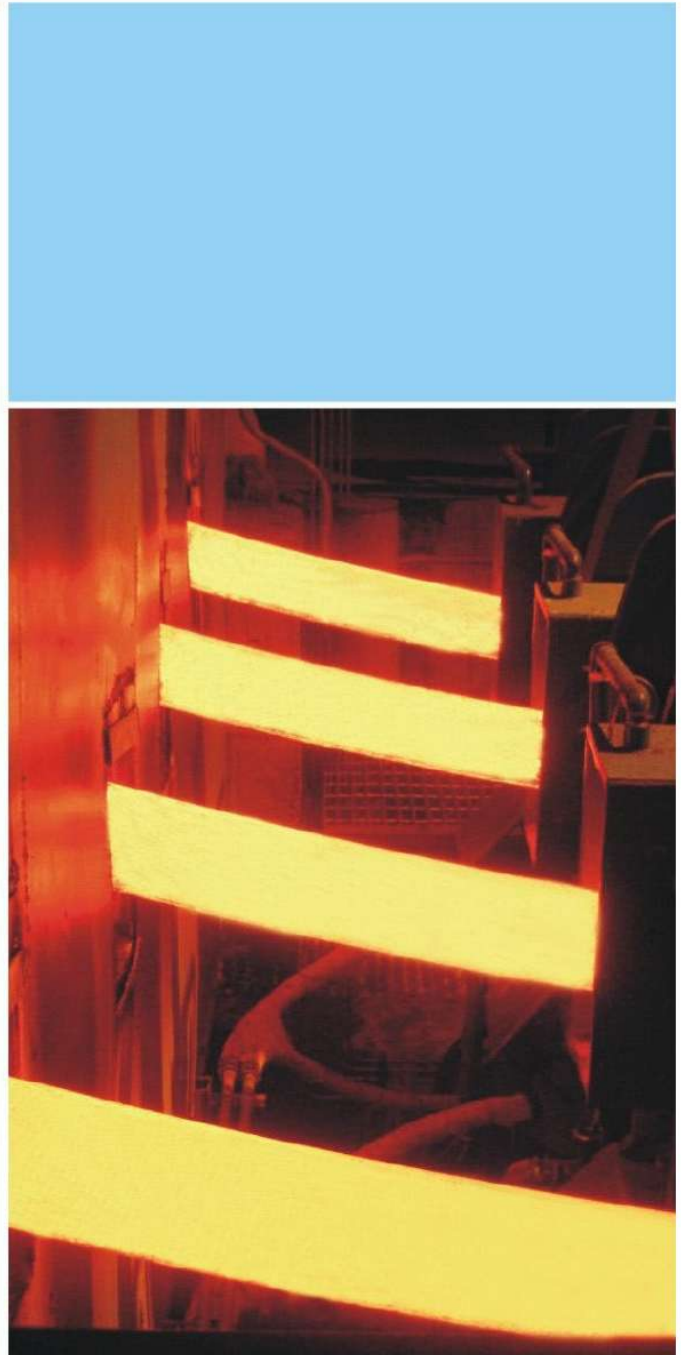




### 3. 4-strand round & billet casting machine for Dongfang I&S company

#### Features:

Annual Capacity	600,000t/a
Steel Grade	Carbon steel, alloy steel, bearing steel, piping steel
Caster Radius	9m
Strand Number	4
Casting speed	1.2~3.0 m/min
Section Size (mm)	Dia. 125, 155, 190, 215, 180x220
Type of Equipment	Curved type
Put into Production	December, 2003
Remarks	Turnkey contract (EPC)



## Strip Processing Line



### 1. Pickling line (Push-Pull type) for Guangdong Huamei Steel Group Co., Ltd.

#### Features:

Contract Type	Engineering, Mechanical & Electrical Equipment Supply
Annual Capacity	400,000t/a
Technical Data	strip thickness: 1.8~4.0mm
	strip width: 700~1300mm
	line speed: Max.120m/min
Put into production	May,2006



## 2. Continuous hot-dip galvanizing line for Xinjiang Bayi I&S Co., Ltd. (Baosteel Group)

### Features:

Contract Type	Engineering, Mechanical & Electrical Equipment Supply
Annual Capacity	150,000t/a
Technical Data	strip thickness: 0.25~1.6mm
	strip width: 720~1300mm
	coil dia.: $\Phi$ max.1900mm
	line speed: Max.120m/min
Put into production	December,2004





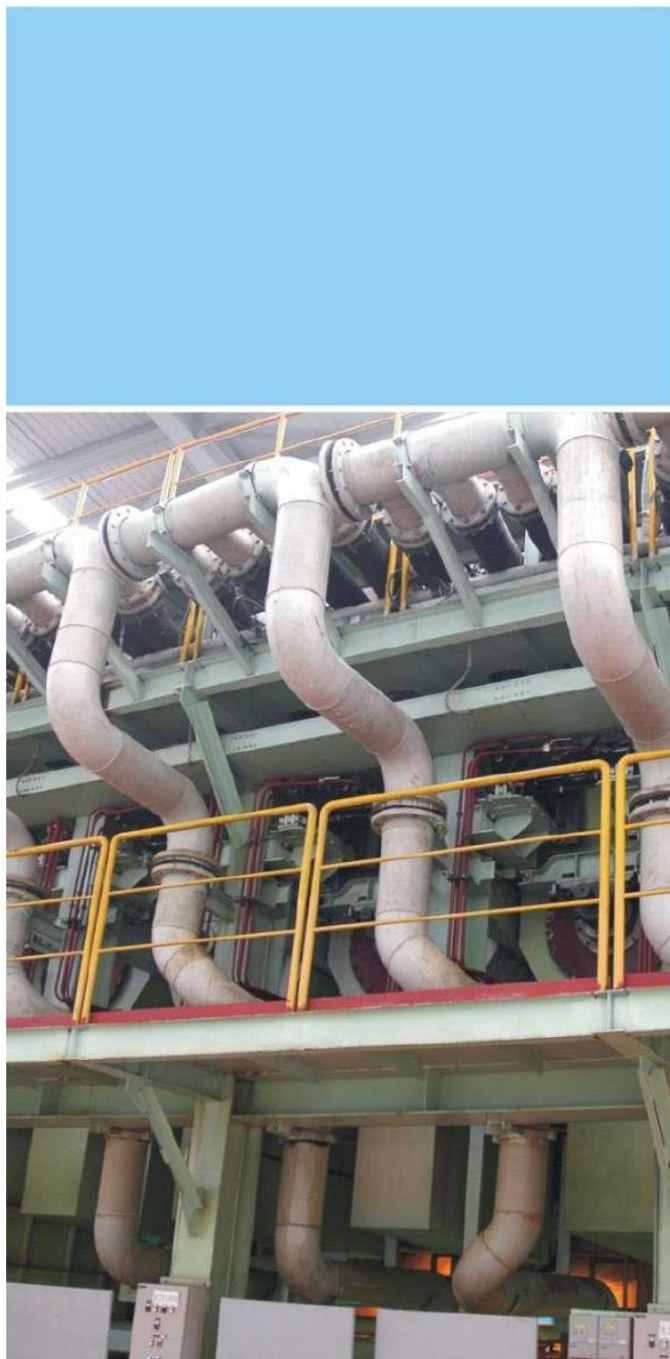


### 3. Strip color-coating line for Guangdong Huamei Steel Group Co., Ltd.

#### Features:

Contract Type	Engineering, Mechanical & Electrical Equipment Supply
Annual Capacity	100,000t/a
Technical Data	strip thickness: 0.2~1.2mm
	strip width: 700~1250mm
	coil dia.: $\Phi$ max.1500mm
	line speed: Max.80m/min
Put into production	April,2005





#### 4.Strip electroplating line

##### Features:

Annual Capacity	50,000t/a
Technical Data	strip thickness: 0.3~1.6mm
	strip width: 800~1250mm
	coil dia.: Φ1900mm(Material) Φ1450mm(Product coil)
	line speed: Max.60m/min (Entry and Delivery) Max.45m/min (Process line)
Put into production	October,2006



# Customer Service



CCTEC provides the customers with an integrated customer service system, which mainly includes Technical Support, Erection and Commissioning, Inspection and Maintenance, Training and Spare Parts Supply.

From premarketing research to after-sales service, CCTEC always commits itself to satisfy customers with excellent service.

#### 1. Technical service



#### 2. Erection and commissioning



#### 3. Inspection and maintenance service



#### 4. Training



#### 5. Spare parts service





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