2025

Coupling Pipe Cutting Machine

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JQG Pipe Coupling Cutting Machine | JQG 365

Leading a New Era of Efficient and Intelligent pipe Cutting

一、JQG Pipe Coupling Cutting Machine Production Introduction

1.1 Product Overview

The DSQG series CNC pipe cutting machine is an energy-efficient, high-performance solution independently developed by our company. It is specially designed for industries such as metallurgy, petrochemicals, and machinery manufacturing, offering a new standard in precision pipe cutting.

1.2 Core Technology

Innovative structure design: Stationary pipe cutting with rotating cutter head, combined with gear differential feed mechanism, achieving high cutting efficiency, low energy consumption, and low noise.
Multi-tool coordinated cutting: Three tools working simultaneously, greatly enhancing cutting capacity and stability, quick tool change, suitable for large-scale continuous production.
High-precision feeding system: Self-developed feeding mechanism, feeding accuracy of ±0.05mm, length setting accuracy of ±0.10mm, ensuring consistent cutting dimensions.
High-performance spindle and feed unit: Spindle with high-precision tapered roller bearings, strong rigidity, low temperature rise, long lifespan; feed system with servo motor + ball screw + rolling guide combination, fast response, high precision, strong resistance to thermal deformation.

1.3 Automation and Control System

Equipped with **Siemens 828D CNC system** or **S7-1500 series PLC**, supporting fully automated operations including pipe feeding, length setting, clamping, cutting, releasing, finished product conveying, batch number printing, and scrap discharge.

Supports **automatic, semi-automatic, and manual** operation modes, with a **user-friendly interface** for easy operation.

1.4 Operational Advantages

High efficiency: Continuous automated processing, significantly improving production pace.

Low cost: Long tool life, low energy consumption, easy maintenance.

High precision: High perpendicularity of cut, excellent end-face quality, saving subsequent processing costs.

High reliability: Key components selected from well-known domestic and international brands, strong overall stability, long maintenance cycle.

1.5 Technical Innovations

Innovative concept of stationary pipe cutting with rotating cutter head for energy-efficient processing.

Gear differential feed mechanism achieving high-speed, high efficiency cutting.

Multi-tool coordinated cutting technology.

High-precision feeding and length setting system.

Research and application of industrial Ethernet motion control platform.

二、Pipe Production Process Flow Description

2.1 Loading Stage

Steel pipes are transferred laterally from the storage rack to the feeding rack station by the material

handling device, preparing them for the processing sequence.

2.2 . Conveying and Positioning

The clamping rollers are active to transport the steel pipe longitudinally to the stopper device. Once in position, the rollers stop, and the stopper rises to prevent further movement. The feeding trolley then engages and clamps the pipe, readying it for entry into the processing area.

2.3 Feeding Trolley Forward

With the pipe clamped, the feeding trolley moves forward along the guide rail to the designated starting position for processing.

2.4 Chuck Clamping Preparation for Cutting

Both the rigid and floating chucks engage simultaneously to firmly clamp the pipe, ensuring stability during cutting. The feeding trolley then retracts by the length of one coupling section to create space for cutting and clamps the pipe again.

2.5 Cutting Process

The cutting head initiates the cutting sequence as follows:

- **Forward Cutting**: The cutting head advances and severs the pipe.
- **Retract**: The cutting head withdraws.
- **Return**: The head returns to its initial position, ready for the next cut.

2.6 Pushing Out the Coupling Section

The chucks release the pipe. The feeding trolley advances by one coupling length, pushing the cut section out of the processing area.

2.7 Cycle Processing

The chucks re-engage to clamp the pipe, and steps 5 and 6 are repeated for the next coupling section. This cycle continues until the entire pipe is processed.

2.8 Tail Material Handling

Once processing is complete, the feeding trolley moves the remaining tail section to the unloading device, completing the full processing cycle for one pipe.

2.9 . Next Pipe Processing

The system automatically detects the next pipe and repeats the entire workflow, initiating a new processing cycle

三、Equipment Composition

Each Pipe Cutting line consists of one pipe cutting machine and one set of Auxiliary Machine

No	Items	Qty	Remarks
1	Loading Roller Conveyor Bench	1 Set	Auxiliary Equipment
2	Pipe Clamping Roller	1 Set	Auxiliary Equipment
3	Pipe Cutting Machine	1 Set	
4	Feeding Trolley	1 Set	
5	Position and Stopper Device	1 Set	In the Cutting machine
6	Hydraulic System	1 Set	
7	Lubricating System	1 Set	
8	Emulsion Cooling System	1 Set	
9	Chip Conveyor	1 Set	
10	Control System	1 Set	

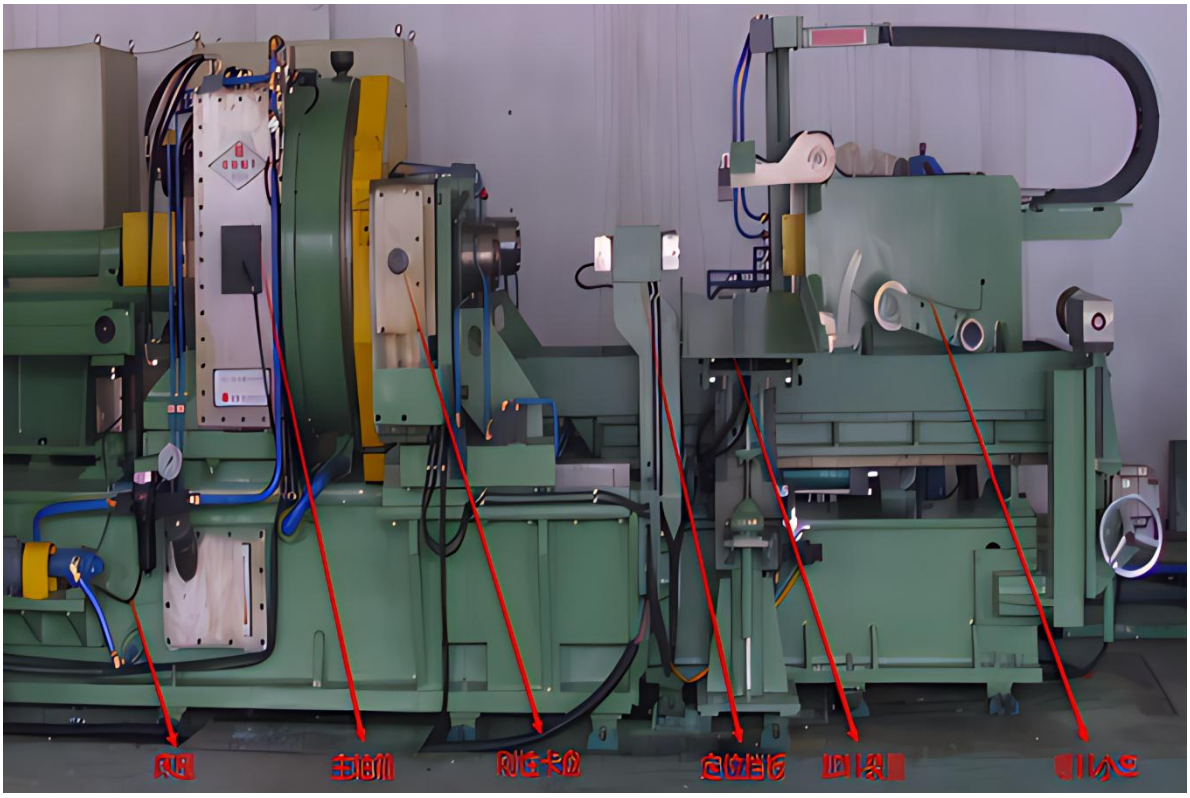
四、Equipment Specification

	Item	Unit	Specification
Performance			
	Process Pipe Dia	mm	Φ365
	Max Wall Thickness	mm	36
	Max Pipe Length	m	12
Spindle System			
	Spindle Rotating Pattern		
	Spindle Speed	rpm	50-300
	Spindle Motor Power	Kw	45
X-Axis Feeding System			
	Feeding Ball Screw Travel	mm	240
	Feeding Ball Screw	mm	Ø50X10
	Feeding Servo Motor		SIEMENS 1FK7101 4.29Kw 27Nm
	Fast Moving Speed	m/min	5
Feeding Trolley System			
	Feeding Trolley Travel	mm	1600
	Ball Screw	mm	Ø63X12
	Ball Screw Servo Motor		SIEMENS 1FK7103 5.37Kw 36Nm
	Fast Moving Speed	m/min	18
Hydraulic System			
	Motor		18.5KW
	Hydraulic Pump flow	L/min	100

	Working Pressure	bar	100
	Oil Tank Capacity	L	About 1000
	Filter Finess	um	10
	Accumulator		25L（56 bar）
Spindle Cooling and Lubricating System			
	Motor Power	Kw	1.5
	Lubricating pump flow	L/min	20
	Working Pressure	bar	3-5
	Oil Tank Capacity	L	About 180L
	Filter Finess	um	10
Centralized Lubricating System			
	Size		AMO-II-150S
	Motor Power	Kw	20w 220V/50HZ
	Lubricating pump Flow	L/min	0.15
	Working Pressure	bar	20
	Oil Tank Capacity	L	4
Cooling System			
	Motor	Kw	4Kw
	Pump Flow	L/min	100
	Working Pressure	bar	20-25
	Water Tank Capacity	L	About 1200
	Filter Finess	um	25-50
Chain Type Chip Conveyor			
	Chip out-let Height	mm	1400
	Speed	m/min	1.4
	Motor		0.55Kw 380V 50HZ
	Back Water Pump Flow		100L/min 1bar
Control System			
	NC System	mm	Siemens

五、The Main Description Of The Mechanical Components

The main structural components of the machine are fabricated from high-strength welded steel plates. Through advanced pre-weld treatment, mature large-part welding techniques, heat treatment, and precision machining, welding stress is effectively eliminated, ensuring excellent rigidity and structural stability.



5.1 Spindle Box

The spindle box is constructed from thick steel plates with optimally arranged internal ribs. The spindle is made of alloy steel, heat-treated, and precision-ground to meet key technical specifications.

It features a large through-hole design and is supported by imported high-precision tapered roller bearings. The spindle system is hydraulically lubricated and oil-cooled, delivering high rigidity, low thermal growth, and superior operational accuracy

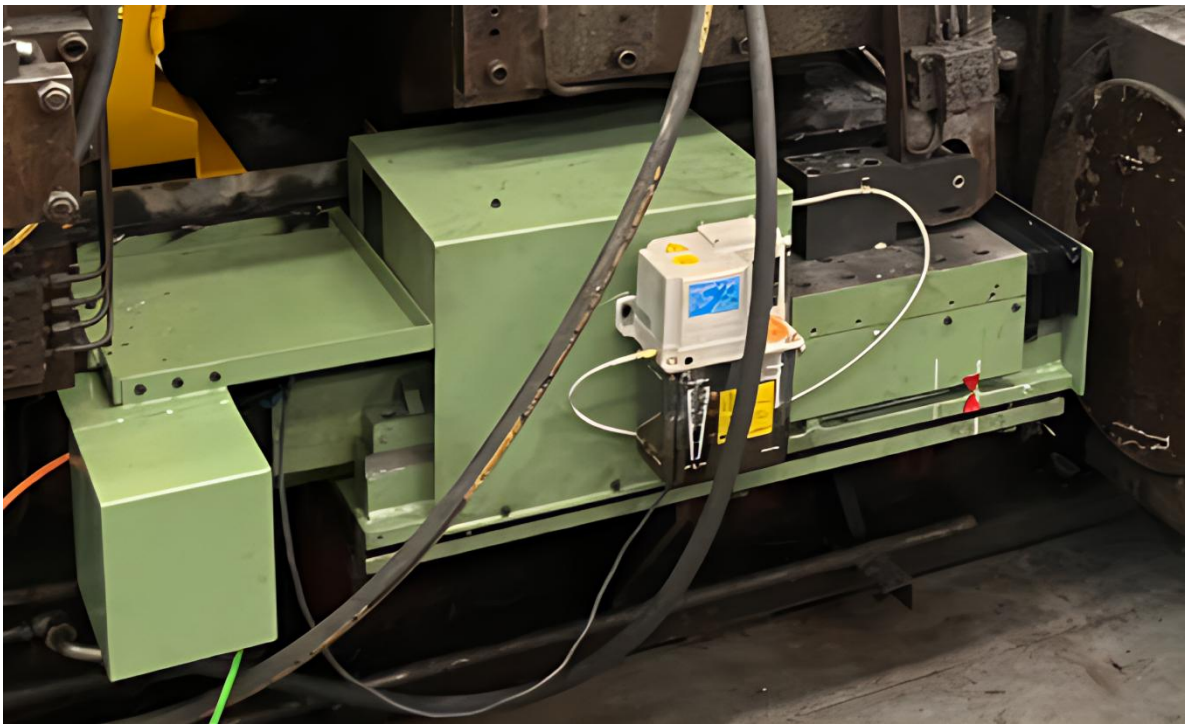
5.2 Servo Feeding System

The feed screw support uses imported high-precision angular contact bearings with grease lubrication, providing excellent rigidity and load capacity.

A travel limiter is installed between the screw and the servo motor to prevent overtravel, effectively protecting both the motor and the cutting tool.

Position feedback is provided by a high-precision absolute encoder integrated into the servo motor,

enabling closed-loop control and significantly enhancing feed accuracy and machining stability



5.3 Clamping System

Clamping Chuck

Before clamping, the hydraulic cylinder drives the left and right rocker arms synchronously via a slider mechanism to ensure coordinated movement. These rocker arms are connected to the left and right sliders, which actuate the clamping jaws to grip the steel pipe. A locking cylinder then secures the sliders in position. This design ensures high clamping rigidity and positional stability during cutting operations.

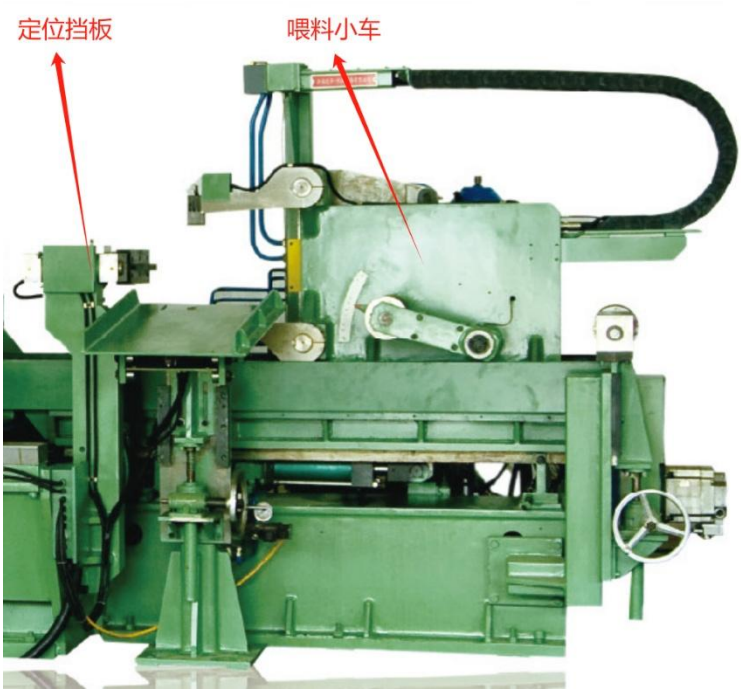
Floating Chuck

The floating chuck is actuated by four hydraulic cylinders controlled by a dedicated valve group. Clamping force is transmitted via pull plates to the clamping jaws, ensuring secure pipe engagement. The dual-chuck configuration provides enhanced stability during cutting operations

5.4 Feeding Trolley (For Coupling Cutting)

The feeding system is driven by a servo motor through a synchronous belt and ball screw, with linear motion guided by precision rolling rails to ensure high feeding accuracy and stability. A hydraulic

clamping mechanism, powered by a hydraulic cylinder, securely grips the steel pipe during feeding. To maintain synchronized movement of the two clamping arms, a mechanical synchronization mechanism is integrated between them.



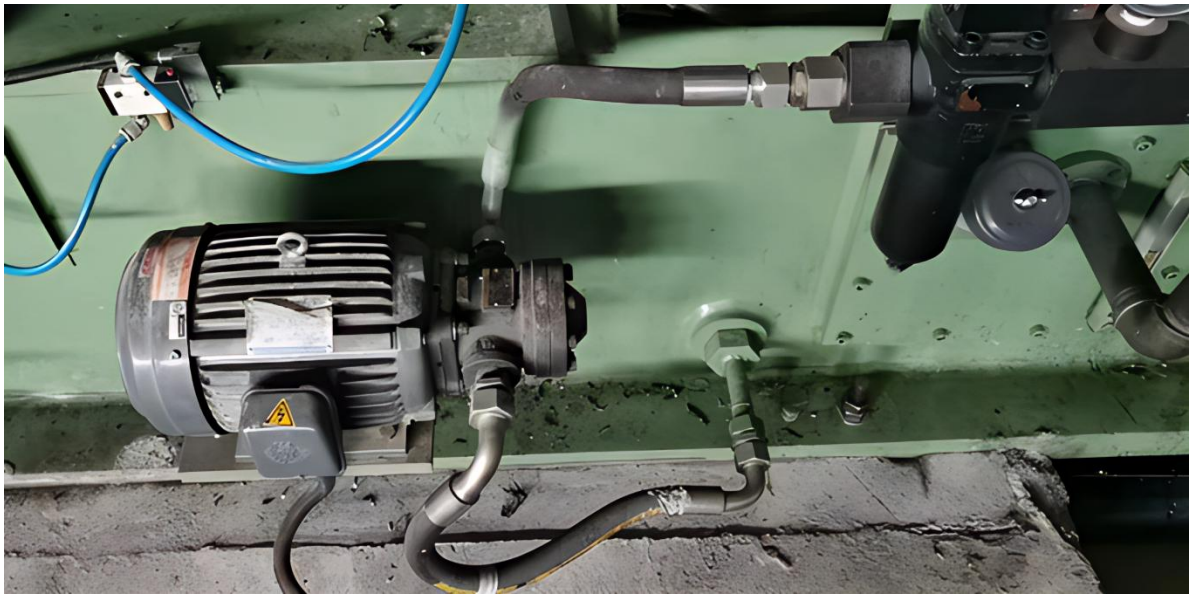
5.5 Positioning Stop Plate

Mounted at the front of the spindle box, the stop plate ensures precise positioning of the steel pipe. In addition to its positioning function, it also serves as a protective buffer. In the event of a malfunction during pipe feeding by the pinch rollers, the stop plate absorbs impact energy, helping to decelerate and stop the pipe, thereby protecting the machine.

5.6 Auxiliary Bench (for Coupling Cutting)

The auxiliary bench consists of a pipe loading platform, including a stopper device, material collecting mechanism, pinch rollers, and size adjustment system. Its primary functions are to support the pipe during processing and to facilitate material transfer, ensuring smooth and accurate feeding of the pipe into the cutting system.

5.7 Lubricating System



The equipment is equipped with three distinct lubrication systems; each tailored to specific functional modules to ensure reliable operation and extended service life.

5.7.1 Centralized Lubrication System (Feeding, Chuck, and Servo Feed Mechanisms)

This system adopts a total-loss lubrication method, delivering oil to key components such as guideways, ball screws, and sliders. Lubrication cycles and oil volumes are adjustable via the electrical control system. Integrated flow sensors connected to the PLC enable real-time monitoring of system performance and alert operators to any abnormalities.

5.7.2 Spindle Lubrication System

The spindle unit utilizes a pressurized oil-spray circulation system. An electric oil pump draws lubricant from the bed reservoir to lubricate critical components such as spindle bearings and gears, while also providing cooling. The system includes a filtration unit and electronic flow switches to ensure consistent lubrication and operational safety.

5.7.3 Auxiliary Machine Base Lubrication

This subsystem relies on manual lubrication to maintain adequate lubrication at designated points. Though simpler in design, it effectively supports the auxiliary components' operational needs.

5.7.4 Common Safety Features

All lubrication systems are equipped with oil level alarm devices to continuously monitor lubricant levels and prevent equipment damage due to insufficient lubrication.

5.8 Emulsion Cooling System

The machine is equipped with a high-pressure, high-flow emulsion cooling system. Cutting fluid is delivered directly to the cutting edge and machining area through coolant channels integrated into the tool head and tool holder. This ensures rapid cooling of both the tool and the workpiece, significantly extending tool life and improving machining quality. The system provides effective chip evacuation and maintains consistent cutting performance.

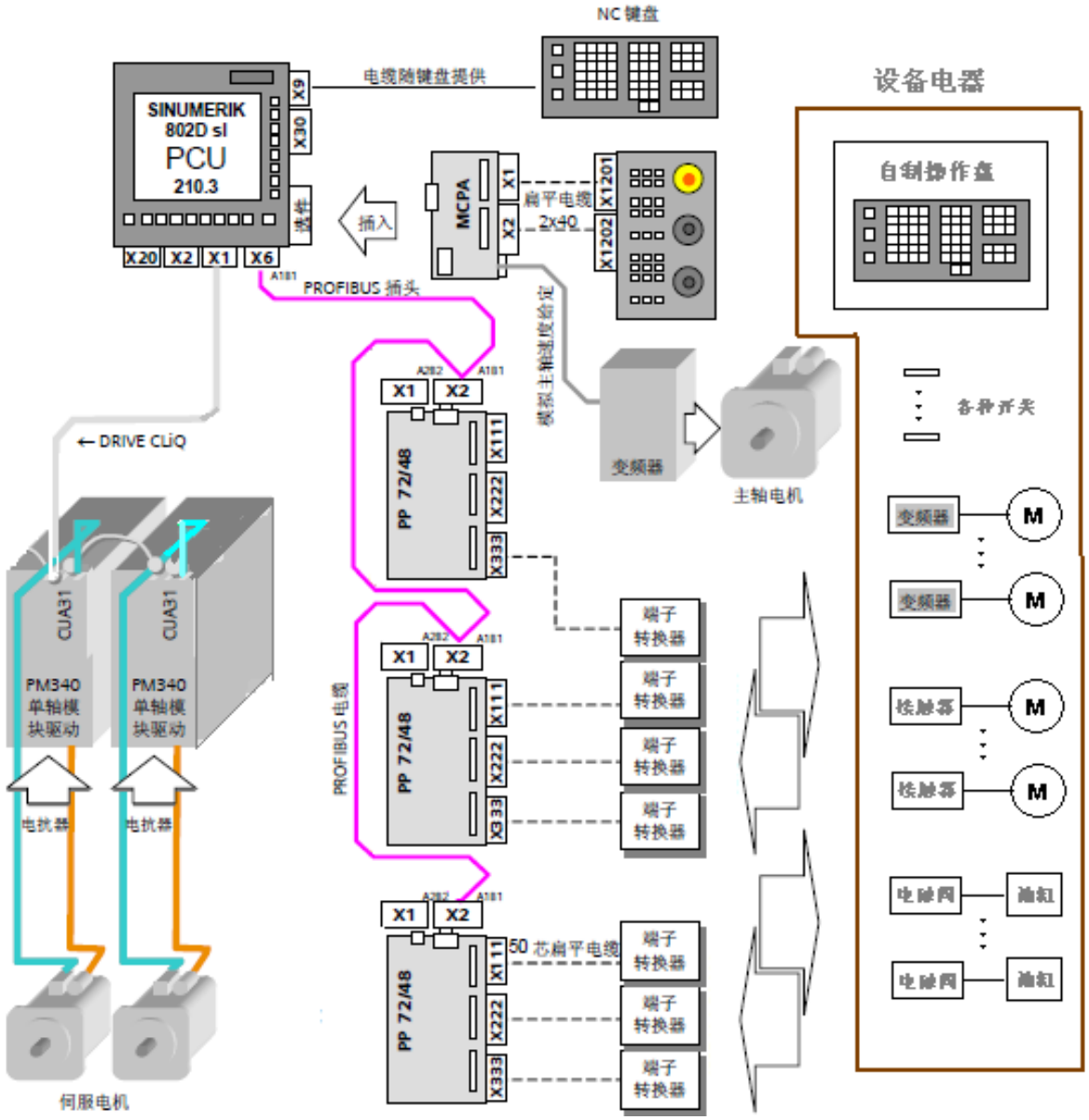
A chip conveyor is included, featuring a return pump that filters and recycles the emulsion from the chip conveyor tank back to the main coolant reservoir. Additionally, a liquid level detection device is installed to monitor coolant levels and ensure continuous system operation.

5.9 Hydraulic System

The hydraulic power unit is a fully independent system, with installation location customizable according to end-user requirements. It is responsible for all hydraulic operations of the machine tool and the loading platform. A hydraulic valve station mounted on the spindle box integrates all solenoid valves, pressure-reducing valves, and other hydraulic actuators. These components control the clamping and centering of the hydraulic chuck jaws, the positioning of the stopper device, and the balancing of the feed slide and tool post.

The system is equipped with sensors for **liquid level**, **pressure**, and **oil temperature** monitoring, ensuring stable and safe hydraulic performance during operation.

六、Electrical System Specifications



6.1 System Composition

The pipe cutting machine adopts the **Sinumerik 828D sl** control system, which integrates CNC, PLC, and HMI functionalities within its PCU. It is paired with the latest **SINAMICS S120 servo drive system** and **1FK7 feed servo motors** from Siemens. Spindle motion is controlled via a Siemens variable frequency drive (VFD), managed through the PCU and its MCPA analog interface, which also connects to the standard operator panel.

Three **PP72/48 PLC I/O modules** are connected via the **ProfiBUS** network, enabling control of the machine body and peripheral electrical components through terminal converters. The electrical control cabinet is installed near the main machine in a location optimized for accessibility and safety.

6.2 System Functions and Main Operation Screens

Feed Axis Control: The X-axis cutting feed is controlled in a semi-closed loop by the Sinumerik 828D sl PCU and SINAMICS S120 servo system.

Spindle Control: Spindle speed is regulated by the PCU in conjunction with the Siemens VFD system.

Auxiliary Functions: Operations such as pipe clamping, material discharge, feeding system, hydraulic system, lubrication, and cooling are managed by the integrated **SIMATIC PLC**, which also handles signal acquisition from switches and sensors.

6.3 Monitoring and Safety Features:

- The coolant tank includes high/low level alarms to control the coolant and booster pumps.
- The hydraulic system features pressure sensors, oil level detection, and differential pressure monitoring across filters. An alarm is triggered when the pressure drop exceeds 0.35 MPa, indicating filter blockage.
- **The spindle lubrication system includes:**

✧ A pressure relay to monitor oil pressure (stopping the spindle if pressure is too low),

✧ A piston-type flow switch to monitor oil flow (triggering an alarm if flow is insufficient),

✧ A filter with differential pressure detection (alarm at 0.35 MPa for cleaning or replacement).

6.4 Main HMI Screens:

- **Operation Screen**: Displays machine mode (automatic/manual), current program and segment, axis positions, spindle speed, and feed rate.
- **Parameter Setting Screen**: Allows input of R-parameters, tool data, and workpiece zero points for different products.
- **Program Editing Screen**: Used to create, modify, and select programs for automatic operation.
- **Alarm Diagnosis Screen**: Displays error codes and descriptions for troubleshooting.

6.5 Modes of Operation

The pipe cutting line supports **automatic**, **semi-automatic**, and **manual** modes:

- **Automatic Mode**: All subsystems (feeding, cutting, discharging, and marking) operate in fully

automated coordination. The operator selects the appropriate program and initiates the cycle via the “Cycle Start” button on the machine panel.

- **Semi-Automatic Mode**: The cutting machine operates automatically, while other subsystems may be in manual mode. This mode allows continued production during partial faults or maintenance.
- **Manual Mode**: All subsystems are manually controlled for setup and maintenance. Cutting operations are disabled in this mode for safety.

七、Machine Working Video Referral

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八、Other Related Products (Ctr+click can easy access to document)

Billet Cutting Saw Product Series

Billet Cutting Saw JBS -850.pdf

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