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1. 安全警示 Security Caution

本机床配有一些安全装置,以防止操作人员和设备受伤害和损坏。操作者应该彻底弄清各种安全内容及以下规定后再上机工作。

The machine line is equipped with some security devices to guard the operator and the machine not being hurt or damaged. Before operation, the operator must be completely familiar with all the security matters and also the following regulations:

1.1 对上机操作、维修人员的要求

Requirements to the operator and maintainer

- 使用本机床的操作人员应是经过培训具有操作本机床资格的人员。操作人员上机前,应仔细阅读本《使用说明书》,并完全理解使用说明书中的内容,具备操作使用本机床的能力后方可操作。

The operator must be trained. Before operation, they must read carefully and completely understand the manual book.

- 上机操作前,应按有关安全生产条例的要求,穿好防护服,安全鞋,长头发要放在帽子里,禁止带手套。

According to the security requirements, the operator must wear the guarding clothes and security shoes, with long hair in the hat and gloves being disallowed.

- 维修人员应由有资格的或具备专业维修能力人员来承担,以免发生意外。

The maintainer should be the qualified people to avoid the accidents.

1.2 基本操作 Basic Operations:

危险: Danger:

- 变压器、电动机及带有高压接线端子等部位不要去触摸。以免遭到电击的危险。

To avoid the electroshock, don't touch the transducer, motor and the part with high voltage connection extremity.

- 千万不要用湿手去触摸开关,否则会引起电击。

Don't touch the switch with wet hand to avoid the electroshock.

警告: Caution:

- 在使用开关之前,一定要确认,不要弄错。

Confirm the right switch before using.

注意: Notice:

- 要有足够的工作空间,以避免产生危险。

With enough space.

- 应采用单独的接地线,其长度应尽可能的短。

With separate earth wire, the length should be short as possible.

- 操作者应非常熟悉急停按钮开关的位置,以便需要时,无须寻找就会按到它。



The operator must be familiar with the position of the emergency button.。

● 机床出现故障或处于危机状态时，应首先按下急停按钮，然后关闭总电源开关，故障排除之前不准送电。

While the failure occurs or in dangerous state, push down the emergency button first, then turn off the general power.

● 停电时应马上断开总电源开关。

Turn off the switch immediately if the power cut.

● 水或油能使地面打滑而造成危险，为了防止出现意外的伤害，工作地面应保持洁净干燥。

The water or oil makes the ground slid. Keep the ground clean and dry!

● 不要乱碰开关。

Don't touch the switch.

● 使用推荐的液压介质、润滑油、脂或认可的等同性能的油。

Use the recommended hydraulic medium, lubrication or grease or the admissible oil with equivalent performance.

1.3 接通电源之前的要求 Requirements before Turning on the Power:

危险： Danger:

凡是绝缘皮损坏的缆线、软线或导线都会产生电流泄露和电击。所以在接通电源之前，应进行检查。

The electricity will divulge and the electroshock will occur to all the insulated cables, soft wire or lead. Check all the wire before turning on the power.

注意： Notice:

● 为机床所配置的送电开关的缆线和主线路开关用的缆线必须按规定的横截面以满足电力的要求。

The sections of the cable of the power-sending switch equipped on the machine and the main circuitry switch must satisfy the requirements of the power.

● 确保不小于相导线截面的保护接地线牢靠地接到机床的 PE 端子。

Be sure the earth wire with section not less than that of the lead is connected with the PE extremity of the machine reliably.

● 接电源前应仔细检查电气系统是否完好，注意电动机有无受潮。

Check if the electrical system is all right and the motor being moisture.

● 应将液压站油箱的油灌到油标处。在必要时应进行检查并补充注油。

Add the oil to the oil box of hydraulic station to the oil mark. If necessary, check and compensate the oil.

● 各个开关及操作手轮都应灵活、平滑好用。要检查他们的动作情况。

Check if all the switches and the handwheels are flexible and flat.

1.4 接通电源以后的要求 Requirements after Turning on the Power:

注意： Notice:



- 机床安装后第一次使用或长时间停机后使用，应使机床空运转几小时，对每个滑动部件都要用新的润滑油加以润滑。

If used for the first time or after stopping for a long time, the machine line must be run without load for a few hours. Lubricate all the slid parts.

- 注意电动机的旋转方向是否与规定的运转方向一致。

Check if the rotating direction of the motor is the same as the set.

- 检查气动元件，液压元件动作是否准确可靠。

Check if the pneumatic and hydraulic components are accurate and reliable.

1.5 常规检查 Regular Check:

危险: Danger:

- 要检查链条的松紧时,千万不要将手指插到链条和链轮之间。

If check the chain, don't put the fingers between the chain and the chain wheel.

- 在检查剪切装置动作时,千万不要将手指放在上下剪刀之间。

If check the cutting device, don't put the fingers between the upper and down cutters.

- 在检查冲孔模具时,千万不要将手伸到冲模之内。

If check the punching dies, don't put the hand in the punching die.

- 在检查齿轮传动时,千万不要将手伸到齿轮啮合处。

If check the chain transmission, don't put the hand to the joggling place of the gear.

注意: Notice:

- 检查电机、齿轮箱和其它部件是否发出异常的噪音。

Check if the motor, gear box and other parts give out the abnormal noise.

- 检查各运动部件的运动和回位情况。

Check the run and return of the movable parts.

- 检查安全保护装置是否处于良好的状态。

Check if the security guarding device is in good state.

- 检查链条的松紧度，检查链轮轴端锁紧螺钉上的保险铁丝是否牢固无损。

Check the tightness of the chain, and if the insurance iron wires on the bolt which locking the shaft end of the chain wheel is reliable.

1.6 开机前的准备工作 Preparations before Turning-on the Machine

警告: Caution:

- 工作区应有足够的亮度以方便安全检查。

With enough brightness in the working field to be convenient for the security check.

- 机床或设备周围的工具及其它物品应存放有序，保持良好关系和人行道畅通。

Keep the tools and other things on and around the machine line in good order.

- 工具或其他任何物品都不要放在电控柜、防护罩上或机床的任一位置。



置上。

Don't put the tools or other things on the electric box, guarding cover or any position of the machine.

- 材料卷起吊时，要保持平稳，操作人员应远离起吊料卷。

Keep the coil flat and stable while lifting the coil; the operator must be far from the coil.

- 如果重型的材料卷中心孔尺寸太大，在放料架顶装时很可能会失稳。在三爪涨紧前增加垫板，且注意对中确保顶装可靠。

If the central hole of the heavy coil is too big, it will be unstable while being installed on the decoiler. Then the spacers should be added and before lifting; also keep the coil in the right place for reliable installation.

- 放料架与机床进料口之间距离应 ≥ 5 米。

The distance between the decoiler and the feeding mouth of the machine line should be not less than 5 meters.

- 料卷转动方向，应符合图示要求。

The rotating direction should comply with the drawing.

注意： Notice:

- 开始使用机床前，仔细检查电器系统是否完好。接线及插头联接是否正确，运输中是否有连线振松、虚接情况。接通后，检查电机旋转方向是否符合规定。

Before using the machine line, check if the electric system is good; if the connection between the wires and plug right; if the connector is stable and reliable. Then check if the rotation direction of the motor complied with the requirements.

- 检查液压管路是否完好无渗漏。接通后，检查电机旋转方向是否正确，液压油是否符合规定。

Check if the hydraulic pipes are good. Then check if the rotation direction of the motor is right, and hydraulic oil is in accordance with the requirements.

- 检查机床各操作手轮手柄动作是否灵活。

Check if all the handwheels and handles of the machine line are flexible.

- 放料架与进料口之间的地面如不光洁平滑，应垫上泡沫板或定制托料架，防止粗糙地面擦伤板料。

If the ground between the decoiler and the feeding mouth is not flat, the foam plate or the holding rack should be added to guard the panel not being scratched.

- 检查所有安全防护装置的功能。如限位碰停互锁机构等。

Check all the guarding devices.

- 开机前关好链条护罩。

Close the chain cover before turning on the machine.

- 撤离工作区周围与操作无关的人员。



Keep off all the other people except for the operator.

1.7 操作 operations

危險: Danger:

- 在机床主轴运转时, 任何情况下, 禁止抚摸机床任何旋转件和运动件, 严禁打开电控柜, 裸露电控元件。

While the machine is working, anyhow, don't touch the rotating or moving parts; don't open the electric box to expose the electrical components.

- 披着长发, 不要操作机床, 一定要戴工作帽后再工作。

To operate the machine line with the long hair in the working hat.

- 操作机床时不得戴手套。否则, 很可能引起误操作或发生缠绕卷入危险。

Don't wear the gloves. Otherwise the wrong operation or the entanglement will happen.

- 不要用手或任何方式去触摸加工中的剪切刀口和冲模凹凸冲头。

Don't touch the cutting blade in working or the punching head on the die by hand or any other things.

- 在没有关好安全防护装置的前提下, 不得操作机床。

Don't operate the machine line without closing the guarding cover.

警告: Caution:

- 一定要在停机的状态下调整辊轮间隙。

Adjust the roller seam with the machine stop.

- 在成型加工期间不要测试辊缝间隙和剪刀间隙。

Don't test the clearance of the roller seam or the cutter while in rollforming processing.

- 初始加工, 扶正扳头时, 电控操作人员要密切配合, 随时揿动急停按钮, 以防发生事故。

While in the beginning, to adjust the pulling head in the right place, the electric operator must press the emergency button at any time to avoid the accident.

- 机床运转时, 不允许其他人员在工作区域内停留。

Keep off any other people in the working field while the machine line working.

注意: Notice:

在完成首件工作时, 操作者需要暂时离开机床的时候, 应将主机运行停止按钮关闭, 同时也应将主电源开关关闭。

After the first task finished, if the operator needs to leave the machine temporarily, the main machine working switch and also the main power switch should be shut.

1.8 完成加工之后 After Finishing Processing

注意: Notice:

- 机床停机后, 要清洁机床, 清除废料。



Clean the machine and clear out the scraps after the machine stops.

- 将机床的各部件回位。

Return all the parts of the machine line.

- 检查液压油的污染情况，如果混杂情况严重，则应更换。

Check the hydraulic oil and change it if being polluted heavily.

- 检查液压泵、电动机温度是否正常。

Check if the temperature of the hydraulic pump and motor is normal.

- 清理辊轮粘附物，用细砂布细心打磨辊轮起毛表面。

Clear the sticky matters on the rollers and polish carefully the fuzzing surface of the rollers with emery cloth.

- 在下班或离开机床前，应将总电源开关关闭，锁好电控柜门。Before off duty or leaving the machine, shut the general power switch and close the electric box.

1.9 安全设施 Security Establishments

- 链条护罩。 Chain cover.
- 急停按钮开关。 Emergency button switch.
- 行程限位开关。 Limit switch.

1.10 维修操作 Maintenance

危险: Danger:

- 凡是与维修工作无关的人员都不应当操作主线路开关或操纵电控柜面上的任何按钮。为此，在这样的开关上或其他相应的地方应挂上《不得按动开关，机床正在维修》或相类似告诫字样。这种告诫指示牌应显而易见，并容易摘取但不易脱

Nobody but the maintainer can operate the main circuit switch or any button on the electric box. So the caution like or similar to "Don't touch the switch, the machine in maintaining" should be hung on the switch or relevant place; also the caution should be obvious and easy to take off but not easy to drop.

- 带电对机床进行维修是危险的，原则上，在维修期间，主线路开关应自始至终都处于关闭状态。

While in maintaining the machine, the switch should be shut. It is dangerous to work with power on.

警告: Caution:

- 电气维修工作应由熟悉业务的人员来承担并应同负责人员保持密切联系，不要自行决定。

The maintenance should be performed by the people familiar with the operation. Also keep in touch with the functionary closely.

注意: Notice:

- 行程极限装置，接触开关等互锁机构都不要卸掉或修改。

Don't remove or revise the stroke limit device or the touch switch, etc.

- 应该使用合格厂家生产的电气件和液压元件。

Use the eligible electric and hydraulic components.

- 维修工作完成后，应进行清理和安排，擦除各零部件上的灰尘、杂质保持良好的工作环境。

After maintaining, clean and clear the dust and the impurity on the spare parts for a good working environment.

- 清理的废料都应放到远离机床的地方予以收集。

Collect and place the flotsam far from the machine line.

1.11 禁止 Forbiddance

禁止在主机运转时输入和改变有关数据。

Don't input or change the relevant data while the machine working.

禁止在机床运转时检查零件间隙、排除故障、清理废料等不规范操作。

Don't check the clearance of the spare parts, remove the failure or clear the flotsam, etc.

禁止穿宽松式外衣、佩带有碍操作的饰物、戴手套以及披着长发操作。

Don't wear the large and loose coat, ornament blocking the operation, gloves, or operate with long hair being unwrapped.

禁止未经授权的任何人启动、操作、维修机床、打开电控柜门和触动电器件。

Without authorities, don't start, operate, maintain, open the electric box or touch the electrical components.

2 概述 Generalization

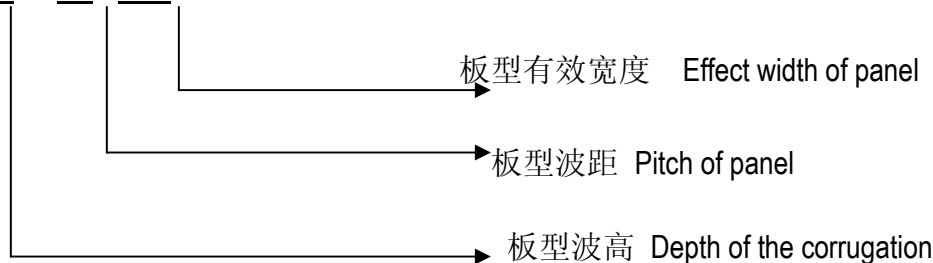
2.1 适用范围 Applicable Range

本使用说明书适用于冷弯型钢、楼承板和彩钢瓦压型机组。

This manual book is only applicable for cold bending steel machine set, steel-hold panel machine set and color steel tile machine set.

2.2 型号组成的含义 Signification of the Machine Type

XX----XX--XXX





2.3 机床的功用和加工范围

The Function and Processing Range of the Machine Line

2.3.1 机床的功用 The Function of the Machine Line

本机床运用 PLC 控制器、变频器等电子电路设计和程序编程，适应现代化自动流水线作业。根据客户要求，可定制各种规格冷弯型钢、楼承板和彩板屋面瓦墙面板的生产。

With PLC controller and transducer, the machine line can adapt the automatic flow working. It can manufacture various specifications of cold bending steel, steel-hold panel and color wall/roof panel according to the customer's requirements.

2.3.2 加工范围 The Processing Range of the Machine Line

机床加工范围应根据机床规格及其定制时要求的技术参数确定。禁止超过机床的规格参数范围加工。否则会损坏机床、损坏板料甚至发生人身伤亡事故。

The processing range should be set according to the specification of the machine line and the technical parameters required. Don't make the machine line work beyond the machine's specification parameters. Otherwise the machine or the material will be damaged, even the accident will happen.

2.4 机床的精度 Accuracy of the Machine

本机床的精度符合 Q/320206JQHF01—2003 标准。

The accuracy of the machine is in accordance with the standard Q/320206JQHF01—2003.

2.5 机床的使用环境 Working Environment of the Machine

本机床应适合在下述规定的实际环境和运行条件中使用。

The machine line should work under the following conditions:

- 环境温度: 5°C ~ 40°C 范围内, 且 24h 平均温度不超过 35°C.

Environment temperature: within 5°C ~ 40°C, and the average temperature can't be over 35°C in 24h.

- 相对湿度: 30% ~ 95% 范围内, 且湿度变化的原则是不应引起冷凝.

Relative humidity: within 30% ~ 95%, and the humidity change can't cause the frozen.

- 海拔高度: 1000m 以下.

Height above the sea level: lower than 1000m.

- 大气: 没有过分的灰尘、酸气、腐蚀气体和盐分.

Atmosphere: without too much dust, acid gas, erosion gas or salinity.

- 避免阳光直射机床, 或热辐射机床而引起环境温度的变化.

Avoid the environment temperature change caused by the sunlight shining straightly or heat-radiation to the machine line.

- 安装位置远离振动源.



The machine line should be installed far from the vibrating sources.

- 安装位置远离易燃、易爆物品。

The machine line should be installed far from the flammables and explosions.

2.6 机床对环境的影响

The Machine's Influence to the Environment

本机床对环境无不良影响，无有害气体或液体排放。

The machine line has no blight to the environment, with no harmful gas or liquid being sent out.

3 机床的运输、吊运与安装

The Transportation, Swinging and Installation of the Machine

3.1 机床的运输 The Transportation of the Machine

机床在运输过程中，应采取相应的防湿、防腐蚀和抗冲击措施。海运过程中应采取防海水侵蚀措施。本机床能经受住环境温度： $-15^{\circ}\text{C}\sim 45^{\circ}\text{C}$ ，相对湿度： $30\%\sim 95\%$ 。

During the course of transportation, measures for moisture resistance, corrosion resistance and impact resistance should be taken. While transportation by sea, measures for sea water corrosion should be taken. The applicable environment temperature is $-15^{\circ}\text{C}\sim 45^{\circ}\text{C}$, the relative humidity is $30\%\sim 95\%$.

3.2 机床的吊运 The Swinging of the Machine

用起重机吊运机床，钢丝绳与机床接触处，必须垫上木板或套胶管于钢丝绳上，以免吊伤机床。

While the machine is swung by the crane, at the contacting place between the steel rope and the machine line, the wood board should be set or the plastic pipe should be covered on the steel rope to avoid scratching the machine.

起重机起吊能力应大于 10T，钢丝绳直径应大于 22mm

The loading capacity of the crane should be over 10T, the diameter of the steel rope should be over 22mm.

注意： Notice:

- 要保持被吊动机床在纵横方向保持平衡，因此，在机床刚刚吊离地面时，就应使机床确保平衡。

To keep the machine being swung balance longitudinally and transversely, the machine should be kept balance just from it leaves the ground.

- 吊运钢丝绳角度不得大于 60 度。

The angle of the steel rope should not be over 60 degree.

- 无论何时吊运机床，只要不是一个人来执行，就应采取相互间给出信号来协同工作。

Anytime the machine being swung, except for only one operator, the operators should cooperate with each other by giving the signals.



3.3 机床的安装 The Installation of the Machine

3.3.1 安装前的准备工作 Preparation before Installation

机床的安装应符合 2.5 条规定的使用环境。此外还应注意：

The installation of the machine should be complied with the applicable environment mentioned in 2.5. Also pay much attention to the following:

- 机床应安装在具有避雷装置的厂房区内。

The machine should be installed in the workshop equipped with lightning conductor.

- 安装机床的地面必须坚实而平整。

The ground where the machine installed should be stable and flat.

- 如果机床在不得已的情况下，必须安装在接近振动源附近，需在机床周围挖槽沟或类似的措施以减少振动。

If the machine must be installed nearby the vibrating sources unavoidably, the trough or channel should be dug around the machine or other similar measures should be taken to reduce the vibration.

3.3.2 动力接口 Power Connector

电源接线端子 R、S、T，零线 N，接地螺钉均位于电控柜内电器安装板左下方。

All the wire connecting extremity R, S, T, naught wire N and the earth bolt should be set at down left of the installation panel in the electric box.

3.3.3 总电源 General Power

本机床在订货合同无特别要求时的电压、频率及允许波动范围。Without special requirement stipulated in the contract, the voltage, frequency and their fluctuation range of the machine is as follows:

电压：380V，稳态电压值为 0.9~1.1 倍额定电压。

Voltage: 380V, the stable voltage is 0.9~1.1 times of the rated voltage.

频率：50Hz，稳态频率值为 0.99~1.01 倍额定频率(连续工作)；

稳态频率值为 0.98~1.02 倍额定频率(短时工作)。

Frequency: 50Hz, the stable frequency is 0.99 ~ 1.01 times of the rated frequency(continuous working);

the stable frequency is 0.98~1.02 times of the rated frequency(short time working).

3.3.4 安装 Installation

对于机床来说，安装方法对机床的功能有极大的影响。如果安装不当，则会产生跑偏、擦漆、切口毛刺等缺陷，达不到最初调试的理想效果。

The way of installation has a great effect on the machine. If the machine installed improperly, the disfigurement like deviation, scratching the painting and burr on the kerfs, etc. will happen. And the ideal result in commissioning can't be reached.

3.3.4.1 地基 Foundation

安装机床应选择一块坚实而平整的地方. 然后根据规定的环境要求决定安装位置, 并做好地基.

Select the stable and flat place and decide the installation position according to the environment requirement and then make the foundation.

主机的安装地基, 应为 >150mm 厚的混凝土地基, 其地表平面度 <6mm, 水平度 <2 度.

The foundation of the machine should be made by the concrete in over 150 mm, the flatness of the ground should be less than 6 mm, and level is less than 2 degree.

占地面积除机床操作所需的空间外, 还要考虑调整维修所需的空间.

Besides considering the space for operating the machine, the space for adjusting and maintaining the machine should also be considered.

3.3.4.2 安装程序 Process of Installation

● 首先找正主机安装位置, 检查机床底座与地面的接合是否平稳, 有间隙的地方, 须用楔形垫铁进行适当调整.

First select the installation position of the main machine, and check if the connection between the base of the machine and the ground is stable. If the clearance exists, the cuneiform iron spacer should be used to adjust it.

● 根据主机安装位置, 找正放料架安装位置. 放料架与主机送料辊之间的距离, 应大于 5 米. 放料架涨紧旋转轴线应与主机走板中心线垂直. 料卷安装应对正主机上进料导向位置.

According to the position of the main machine, select the position of the decoiler. The distance between the decoiler and the feeding roller should be over 5 meters. The tension and rotation axes of the decoiler should be upright to the center line of the main machine. The coil should be right to the guiding device of the main machine.

● 成品输送架, 应紧靠剪切模架安装. 高低位置, 可通过调整底脚螺丝来实现, 确保平齐对接.

The run out table should be installed tightly closely to the cutting die. The position can be adjusted by the bottom bolt to guarantee the flat connection.

● 电控柜应考虑安装在方便操作的人行道旁, 光线应明亮. 一般安装在机床正面, 靠右部位. 离机床距离一米左右, 操作方向应面对机床.

The electric box should be installed beside the sidewalk with bright light. Generally it is installed on the face and right of the machine. It is about 1 meter from the machine, with operation direction facing the machine.

3.3.4.3 内部设施连接 Connecting the Inner Establishments

完成调平对接工作后, 在接通机床之前, 应做以下工作:

After the connection finished, before turning-on the machine, the followings should be completed:

- 重新检查各连接部位是否可靠。

Recheck if each connecting parts is reliable.

- 检查并确保输入电源相位正确。如果电源为反相位，那么电动机旋转方向与规定的旋转将不一致，须重新接插。电源连接详见电气部分有关章节。

Check and ensure the input power with right phase. If the phase is opposite, the rotating direction of the motor will not comply with the stated direction, and then it needs to be connected again. Please refer to the relevant chapters in the electric parts about the power connection

- 按序对接好气动、液压管件。

Connect the pneumatic and hydraulic components in order.

3.3.4.4 试车 Commissioning

完成内部设备的连接以后,应做好以下试车前的准备工作:

After connecting the inner establishments, the following preparations for commissioning should be done:

- 将为便于运输而拆下的部件、管件和防护罩等,检查安装到位。Check if all the spare parts and guarding cover dismantled for convenient transportation are installed properly.

- 清理机床上所有灰尘和脏物。

Clean all the dust and dirty matters on the machine.

- 为了防锈,机床的部分金属件表面,已涂上了一层防锈剂。在运输过程中可能粘附灰尘、沙粒和其他脏物。所以,一定要将防锈涂层清理干净。

The surface some metal parts of the machine are painted with antirust. During the course of transportation, some dust, sand and other dirty matters adhere to the surface of the antirust. Then the antirust should be cleaned.

- 在清理时,应用煤油洗净防锈剂。

The antirust should be cleaned by kerosene.

- 检查: Check:

- ★ 机床各部件有无损坏?

If the spare parts are damaged.

- ★ 有无零件、附件遗失?

If the spare parts or accessories are lost.

- ★ 机床各传动部分是否得到润滑?

If all the driving parts are lubricated.

- ★ 气动、液压管件是否安装牢固密闭?

If the pneumatic and hydraulic parts are installed reliably.

● 试车 Commissioning

做好上述试车前的准备工作后，谨慎地揷动“启动”按钮，空车运转，剪刀、冲模试动作，在整个试运转期间，操作人员不应离开电控柜，谨防出现意外无法实施紧急停机。

After the preparation for the commissioning, press the START button carefully and run the machine without load, and check the running of the cutter and punching die. While in commissioning, the operator can't leave the machine to avoid the emergency.

4 机床传动系统 Driving System of the Machine

4.1 主传动系统 Main Driving System

本机床由电动机通过摆线针轮减速机减速，经链轮链条传动，将动力传递给各道轧辊，使之相对旋转工作。

The machine is driven by the motor via the cycloid pin wheel reducer, through the chain to drive the rollers

4.2 液压传动系统 Hydraulic Driving System

电动机带动液压油泵，经过高压管道，将液压油输送到油缸。通过液压元件调控，使活塞作直线反复运动，带动剪刀动刀片或冲模上冲头上下运动，实施剪切或冲孔动作。

The motor drives the hydraulic pump to feed the hydraulic oil to the cylinder via high pressure pipe. Through the hydraulic components, the piston can repeatedly move linearly to drive the movable blade of the cutter or the top punching head on the punching die to move up and down.

● 液压系统工作介质：YA—N32 普通液压油，工作温度下的粘度应为 $27.5 \times 10^6 \text{m}^2/\text{s}$ ，密度应为 $900 \text{kg}/\text{m}^3$ 。

The media in the hydraulic system: YA—N32 common hydraulic oil, its viscosity is $27.5 \times 10^6 \text{m}^2/\text{s}$ and density is $900 \text{kg}/\text{m}^3$ in the working temperature.

● 液压系统正常工作温度 $30^\circ\text{C} \sim 55^\circ\text{C}$ ，系统工作压力 16MPa。

The normal temperature of the hydraulic system is $30^\circ\text{C} \sim 55^\circ\text{C}$, pressure is 16MPa。

5 机床的调整 Adjustment of the Machine

辊轮之间的间隙和剪刀、冲模间隙，直接影响板型的形状位置尺寸以及切口毛刺的大小。

The clearance between the rollers or between the cutter and the punching die will directly influence the shape, position, size of the panel and burr on the kerf.

机床的调整，是一项技术性很强的工作，机组地基的平整度，辊轮的间隙和位置、轧制过程产生温度的高低差、板料分剪后的松紧边以及板料厚薄和材质硬软等因素，都会引起板型形状位置尺寸变化。这就要求调试工作人员，必须具备丰富的实践操作经验和善于分析问题的能力。



It's a technical project to adjust the machine. The flatness of the foundation, the clearance and position of the rollers, the temperature made in rollforming, the tightness degree of the panel cut, the thickness and material of the panel will change the shape of the panel. So the commissioning operator must have rich working experience and outstanding analyzing ability.

5.1 辊缝调整 Adjustment of the Roller Seam

板料成型, 是通过若干道水平轧辊和辅助立辊, 相对于板料旋转运动, 对板料进行碾压、折弯, 使之屈服成型的过程。

The material is rollformed through the level rollers and assistant standing rollers rolling and bending.

每道轧辊, 无论是分为上下轴安装的水平轧辊, 还是侧向安装的辅助立辊, 都是成对安装的。而成对安装的两辊之间存在一个可以调整的间隙, 即辊缝。

Each roller is installed in pair, whether it is level roller installed up and down or assistant roller installed side. The roller seam is the adjustable clearance between the rollers.

5.1.1 水平轧辊的位置调整

The Position Adjustment of the Level Roller

每道水平轧辊都分别安装在上下两根轴上, 根据板型需要同一根轴上的轧辊, 用若干只隔套相隔, 轴两端由螺母锁紧。隔套制作成哈夫锁扣式, 调整产品规格时, 只需要松开一端锁紧螺母, 就可非常方便地拆换隔套, 位移轧辊, 迅速完成规格调整工作。

Each pair of rollers is installed on the top and down shaft separately. According to the different shapes, the rollers on the same shaft must be separated with many spacers, and the both ends of the shaft be locked by the bolts. The spacers are made into the HALF lock type. While adjusting the specification, only to loose the bolt on one side to change the spacers and move the rollers conveniently.

5.1.2 水平轧辊的辊缝调整

The Roller Seam Adjustment of the Level Roller

成对安装轧辊的上下轴, 两端分别支撑在带有轴壳导向的牌坊上. 牌坊上方设有调节螺杆, 松开锁紧螺母, 旋动螺杆, 即可调整相对轧辊的辊缝.

The up and down shafts should be installed in pair, the both ends of which are supported on the torii with shell. The torii is equipped with adjusting screw. The relative seam of the rollers can be adjusted by loosing the locknut and revolving the screw.

检查板型波高、波距和有效宽度, 一般调整机组的最后一至二道轧辊间隙, 辊缝调小时产生过压, 板型的波高增高、波距和有效宽度减小, 否则相反。

Check the depth and distance of the corrugation and the effect width of the panel.

Generally the last one or two seam of the rollers is adjusted to create the overpressure,



which adds the depth of the corrugation and reduces the distance of the corrugation and effect width of the panel. Otherwise is the reverse.

5.1.3 辅助立辊的调整

Adjustment of the Assistant Longitudinal Roller

某些板型形状复杂或变形角度小于 90° 时，水平轧辊无法压到变形点，对后续压制成形无法进行的情况下，就需设置辅助立辊来完成。

While the profile is complex or the distortion angle is less than 90° , the level roller can't reach the distortion point, and then the next rollforming will not be completed. So the assistant longitudinal roller is equipped.

辅助立辊一般安装在牌坊的内壁。立辊支架固紧螺钉位置，铣有长槽，便于立辊整体位移和相对位移。松开固紧螺钉，移动立辊轴的位置，即可调整立辊的辊缝。

The assistant longitudinal roller is equipped on the inner side of the torii. The rack of the longitudinal roller is fixed by the bolt, with long groove milled on the rack for the whole displacement and relative displacement of the longitudinal rollers. While loosening the bolt, the seam of the longitudinal roller can be adjusted by moving its shaft.

5.1.4 辊缝调整时的注意事项 Notice to the roller seam adjustment

- 辊缝间隙：一般小于板料厚度 0.10-0.15 毫米或等于板厚。

The roller seam: 0.10-0.15mm less than or equal to the panel thickness.

- 调整前对调节螺杆的四方头（或六角螺母）任意一个角的方向位置，进行确认，做好标记，便于准确回位。

Before adjusting, confirm and mark any angle of the adjusting screw (or hexad bolt) to return conveniently and accurately.

- 一次旋转不可太多，一般为 $1/6$ — $1/4$ 圈为宜。

Generally $1/6$ — $1/4$ loop for each adjustment.

- 调整后，查看走板效果是否有所好转，逐渐调整到位，直至板型正常。发现效果相反，应立即回位，反向调整。

After adjusting, check and adjust gradually up to the normal profile. If the result is opposite, return immediately and adjust reversely.

- 调整完毕，锁紧螺母。

After finishing the adjustment, lock the bolt.

5.2 板型直线度的调整 Linear Adjustment of the Panel

对于窄幅厚板的冷弯型钢工件，其直线度一般通过整平、矫正机构的调整，结合辊缝调整后板料走向进行综合分析解决。

To the narrow and thick cold bending steel work pieces, its linear can be adjusted by flating and straightening machine, connecting with the panel moving after seam adjusting.

- 一般以剪刀定刀片切口形状位置为调整基准，确保板型顺利通过，



无擦碰为宜。

Generally the profile of the kerf of the fixed blade is regarded as the adjusting norm, guaranteeing the panel to pass the machine easily and without scratch.

5. 2. 1 月牙形弯曲 Crescent Type Bending

冷弯型钢出现水平方向的月牙形弯曲时, 适当调小月牙内园弧边一端的辊缝, 使之产生过压延伸. 必要时, 稍微调大月牙外园弧边一端的辊缝, 配合进行。

While the crescent type bending occurs in the level direction, reduce suitably the seam on one end of the inner arch of the crescent, to create the overpressure expansion. When necessary, enlarge suitably the seam on one end of the outer arch of the crescent.

装有矫正轮系机构的机组, 则相对位移矫正辊轮, 逐步调直型板。

If equipped with straightening machine, the panel can be adjusted by relatively displacing the straightening rollers.

5. 2. 2 凹凸形弯曲 Sunken and Protruding Bending

冷弯型钢出现上下凹凸形弯曲时, 则通过整平机构的轴辊, 上下平行位移, 相对板型的弯曲方向, 进行反方向拱弯达到整平的目的。

While the Sunken and protruding bending occurs, the panel can be adjusted by levelly moving up and down the rollers of the flating machine, to bend the panel reversely to flat the panel.

5. 2. 3 扭曲 Distortion

针对型板的扭曲变形状况, 垂直调节整平辊轴的某一端, 此时应注意上下两根辊轴相互配合进行。

Regarding the distortion of the panel, adjust vertically one end of the flating rollers. And the up and down rollers should be cooperated.

扭曲整平一般与凹凸形弯曲整平同时进行, 综合分析处理。Generally the distortion flating and Sunken and protruding bending flating can be completed at the same time.

整平、矫直机构, 一般安装在机组最后一道轧辊与剪切机构之间的位置。

The flating and straightening machine are equipped between the last rollers and the cutting system.

整平矫直的调整, 须充分考虑材料反弹因素, “矫直必须过正”。while flating and straightening, the rebounding factor must be considered thoroughly.

5.3 跑偏的调整 Adjustment of the Deviation

板料刚刚进入机组时, 要缓慢引导料头进入轧辊。经过第一、二道轧辊后, 及时检查压痕相对板料幅宽有无偏位。相应调整进料导向机构, 使板料准确进入轧辊。装有板料校平机构的机组, 同时相应调整辊轴, 适当过压小边。



In the beginning, the panel should be guided into rollers of the machine slowly. Check in time if the impress deviates from the breadth of the panel after the first and second rollers. Adjust accordingly the guiding device and make the material feed into the rollers accurately. If equipped with flating device, adjust the rollers simultaneously, with proper overpressure to reduce the breadth.

进入以后各道轧辊后，逐一检查有无跑偏现象，随时对辊缝进行调整，必要时可在辊套之间插入薄型开口垫片，适当调整轧辊位置，消除跑偏走线现象。

After the above adjusting, check the deviation one by one and adjust the seam of the rollers. If necessary, add the thin spacers to the rollers and adjust suitably the position of the rollers to remove the deviation.

5.4 剪刀的调整 Adjustment of the Cutter

剪切分为有废料剪切和无废料剪切两种方法。每付刀片由动刀片和定刀片组成。有废料剪切：备有一块动刀片和两块定刀片，剪切效果好，型板切口平齐，剪切变形小，但会产生与动刀片厚度相等的一截废料。无废料剪切备有一块动刀片和一块定刀片，剪切效果则相反。

The cutting includes flotsam cutting and non-flotsam cutting. Each set of blade consists of the movable and fixed blades. To flotsam cutting, one piece of movable blade and two pieces of fixed blades are used, with good cutting effect like flat kerf and small distortion, but one piece of flotsam with the same thickness to the movable blade occurs. non-flotsam cutting, one piece of movable blade and one piece of fixed blades are used, the cutting effect will be reverse to that of flotsam cutting.

定刀片安装在下刀座上，保持刀片导向面垂直。动刀片安装在吊刀板上，上下运动导向由剪刀架两侧的导向板控制。导向板设有紧固螺钉和支承螺钉，适当调节支承螺钉，即可调整动刀片垂直以及与定刀片接触的剪切间隙。

The fixed blade is installed on the down blade bed. And keep the blade vertical. The movable blade is installed on the hanging board. The moving up and down is controlled by the guiding board on both sides of the cutter rack. The guiding board is equipped with locking bolt and supporting bolt; the verticalness of the movable blade, and also the clearance between the movable and fixed blades can adjusted by the supporting bolt.

剪切间隙在机床出厂时已作调整。一般情况下不必随意再行调整。

The clearance of the cutter has been adjusted before delivery. Generally there is no need to adjust it.

● 刀片是由特种工具钢经锻造淬硬而成。容易断裂，严禁敲击。

The blade is made by special steel through forging. It is frangible. Don't knock at it.



● 调整时, 须谨慎操作, 两端导向板相应调节, 完毕后拧紧螺母。

Be careful to adjust the both sides of the guiding board, and then tighten the nut.

● 有废料剪切, 须将动、定刀片三块重叠, 调整其中一块定刀片。

For the flotsam cutting, the movable and fixed blades should be overlapped, and then adjust one of them.

● 间隙调整时, 要同时考虑动刀片的运动轨迹与刀片接触面的平行度。

While adjusting the clearance, the parallelism between the moving track of the movable blade and the interface of the blade should be considered.

● 剪刀口形状与轧制后的板型基本吻合, 任何情况都不必修磨剪刀口形状。

The form of the cutter must coincide with the profile rollformed. Anyhow, don't revise the form of the cutter.

● 剪刀刃口磨损后修复, 只允许平磨刀片相互接触的侧平面。(减薄刀片厚度)。

While repairing the worn edge of the cutter, only to grind plainly the side where the blades contact.(reduce the thickness of the blades)

● 刀片安装时, 要严格清理接触面, 逐渐、均匀的拧紧螺钉。

While installing the blades, clean the interface strictly and then tighten the bolt gradually and equally.

● 试剪时, 要在无剪切物状态下, 空行程运动, 检验行程开关是否灵敏可靠, 行程是否到位。

While in trying the cutting, run the machine without load and check if the limit switch is sensitive and reliable and can reach the regulated position.

● 严禁手指误入剪切口, 严禁将硬物插入剪切口。

Don't put the finger or the hard thing into the cutting place.

5.5 冲模的调整 Adjustment of the Punching Die

配备冲模装置的机组, 出厂调试时已经对冲孔模具进行了相应调整, 一般不须另作调整。

If equipped with punching die, which has been adjusted before delivery, generally there is no need to adjust it again.

● 更换产品规格, 调整前要作好回位标记。

Before changing the specification, the returning mark should be made.

● 导轨侧面两个调节螺杆, 用来调整模具的整体位置。

The two screws on the sides of the guide way are used to adjust the whole position of the die.

● 两侧丝杆手轮分别用来调整左右两冲模的具体位置。

The two handwheels on the sides are used to adjust the specific position of the right and left punching die.



- 冲模底座四角位置的螺杆, 用来调节整个模架高低水平位置。
The screws on the four corners of the bed of the punching die are used to adjust the level position of the whole rack of the punching die.
- 拆卸上冲模导向压板, 即可更换冲头。
Unload the guiding board of the punching die to change the punching head.
- 装配时, 必须清理导向压板和冲头垫板的接合面, 装好定位销钉。
While in assembling, clean the interface between the guiding board and the spacer of the punching head, and then install the dowel.
- 用厚薄均匀的棉布压入凹凸冲模, 检验冲头四周间隙是否均匀。
Push the cotton piece into the sunken and protruding punching die, to check if the clearance around the punching head is equal.
- 试冲时, 须在无板料状态下进行. 检验行程开关控制, 是否灵活可靠, 行程是否到位。
While trying the punching, run the machine without load and check if the limit switch is sensitive and reliable and can reach the regulated position.

6 机床的维护和保养 Maintenance of the Machine

- 液压站油箱中的油位, 应位于温度计 20—40℃ 刻线之间。
The position of the oil in the oil box of the hydraulic station should be in 20—40℃.
- 经常注意液压泵工作状态, 及时排除异常噪音。
Notice to the working state of the hydraulic pump, and remove the abnormal noise in time.
- 防止雨水和灰尘进入液压油箱。
Avoid the rain and dust entering into the hydraulic oil box.
- 经常清洗滤油器。
Clean the filter usually.
- 更换液压油时, 须将旧油液全部放清, 冲洗油箱, 通过 120 目以上的过滤。
While change the hydraulic oil, remove the worn oil completely, wash the oil box and then be filtered over 120 degree.
- 正常工作状态, 液压油更换周期为 12-18 个月。
Normally the changing period of the hydraulic oil is 12-18 months.
- 经常检查处理液压系统有无漏油。
Check usually if the hydraulic system leaks.
- 经常检查链轮链条传动系统是否运转正常, 有无异常噪音. 传动部分经常注入干净的润滑油或润滑脂。
Check usually if the chain transmission system is normal. Add often the lubrication or lubricate grease to the transmission part.
- 注意维护剪切刀口和冲模, 严禁碰伤受损。



Maintain the edge of the cutter and punching die. Don't hit and damage them.

- 经常清理轧辊工作表面的附作物和积屑毛刺. 保持表面清洁光滑, 无碰伤碰毛.

Clean the adhered matters and scrapes on the surface of the rollers. Keep the surface of the rollers clean and smooth.

- 每次启动机床时, 首先启动液压电机后再启动主电机.

While starting the machine line, first to start the hydraulic motor and then the main motor

- 严禁随意打开电脑控制柜门、护罩壳及油箱盖。

Don't open the computer controller, guarding cover and the cover of the oil box.

- 经常检查液压系统冷却部分是否工作正常。

Check usually if the cooling part of the hydraulic system is normal.

- 停机时, 及时关掉总电源。

While stopping, cut off the general power.

7. 机床的检查、维修

Inspection and Maintenance of the Machine Line

自始至终保持机床处于良好状态, 是延长设备使用寿命, 提高产品质量和生产效率所必须的日常工作, 机床检修一般由操作工人和检修人员配合进行, 检查时必须首先切断电源。

Keep the machine line always in good state to prolong the lifetime and improve the production quality and efficiency of the machine. The machine should be maintained by the operator and the maintainer. Cut off the power first while in checking.

序号 Number	部位 Spare parts	检查项目 Checking item
1	电控系统 Electric system	急停按钮开关是否灵敏, 可靠 If the emergency button is sensitive and reliable. 电动机是否运转正常, 有无不正常的发热现象 If the motor working is normal and heating. 电线、电缆有无破损 If the wire and cable are broken. 行程开关、按钮功能是否正常、动作可靠 If the limit switch and button are normal and reliable.
2	操纵系统 Operating system	调整手柄和气动开关是否正常可靠 If the adjusting handwheel and pneumatic switch are normal and reliable.
3	液压、气动系统	全系统管道接头有无渗漏



	Hydraulic and pneumatic system	<p>If all the pipe connectors of the whole system leak. 系统压力是否稳定</p> <p>If the system pressure reliable. 油温是否在 35°C~55°C 范围内, 不得高于 60°C</p> <p>If the oil temperature is in 35°C~55°C, which can't be over 60°C 噪声、振动有无异常。</p> <p>If the noise and vibration are abnormal.</p>
4	安全防护装置 Guarding device	<p>防护罩壳是否完整, 可靠。 If the guarding cover is complete and reliable.</p> <p>按地装置是否牢固, 有效。 If the earth wire is firm and effective.</p>

8. 常见故障及排除

Analysis and Removal of the Frequent Failure

故障现象 Failures	原因分析 Reason	排除方式 Way to remove the failure	备注 Note
按启动按钮 电动机不转动 Push the START button, but the motor doesn't work	<p>1. 总电源开关没打开 The switch of the general power not open.</p> <p>2. 启动按钮接触不好 The START button is not contacted.</p> <p>3. 数据输入有误 The wrong data input.</p>	<p>1. 打开电源开关 open the switch</p> <p>2. 检查启动按钮接头 check the connector of START button</p> <p>3. 更正输入数据 correct the data input</p>	
设定长度 不准确 The length set is not accurate	<p>1. 编码器中有灰尘杂质 the dust and impurity in the encoder</p> <p>2. 输入数据有误 The wrong data input.</p>	<p>1. 清理编码灰尘杂质, 使辊轮与工件良好接触 clean the encoder to make the rollers contact with the work-piece well</p> <p>2. 清零后重新设定 reset the data returning to zero</p>	
启动液压 电机不出油, 压力上不去 Start the hydraulic motor, no	<p>1. 电动机转向不对 the rotation direction of the motor not right</p> <p>2. 吸油管式过滤器堵塞 filter of the oil pipe blocked</p>	<p>1. 更正电机转向 correct the rotation direction of the motor</p> <p>2. 疏通管道, 清洗过滤器, 换新油 make the pipe fluent, wash the</p>	



oil coming out,without pressure	3. 连接处泄漏,混入空气 The connector leaks,with air coming in 4. 油液粘度太大或油液温升太高 the oil with too high viscosity or temperature	filter and change with new oil 3. 紧固各连接处螺钉 tighten the bolt in the connector 4. 正确选用油液,控制温升 choose the right oil and control the oil temperature rising	
液压系统噪声振动异常 The noise and vibration of the hydraulic system are abnormal	1. 油箱油位不够 the oil position not enough 2. 空气进入液压系统 with air coming into the hydraulic system 3. 吸油口堵塞 the mouth of the oil pipe being blocked 4. 混入雨水和杂质 with rain and impurity being mixed in the oil	1. 补充液压油 add the hydraulic oil 2. 排除系统内空气 remove the air in the hydraulic system 3. 排除系统内空气 wash the filter 4. 更换液压油 change the hydraulic oil	液压油更换周期为12~18个月 The change period of the hydraulic oil is 12~18 months
油温升高 The oil temperature rising high	1. 冷却系统不工作 the cooling system not work 2. 高压软管过分弯曲或重物压堵 the high-pressure pipe being over bended or pressed by heavy things 3. 油液粘度过低或过高 the viscosity of the oil too low or too high	1. 检修式更换 check and change 2. 排除油管阻力 remove the resistance of the oil pipe 3. 正确选择油液,控制温度 choose the right oil and control the oil temperature	正常工作温度35~55℃,不超过60℃ The normal working temperature is 35~55℃, not be over 60℃