大族粤铭激光
YUEMING HAN'S YUEMING LASER

Owner's Manual

3rd CONTROL SYSTEM

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Foreword

Thanks for purchasing the laser engraving machine control system of our company.

Before operating, please read this manual carefully to ensure proper operation.

Please keep the manual properly for reference.

Since the configs are different, certain models do not have the functions listed in this manual. Please refer to the specific functions for details.

Due to the constantly tech update, the specification for reference only, subject to the real standard.

Tags in this book：

 **Alarm**	Special Attention: User must follow and perform as the manual. Otherwise, it could lead to errors or relatively serious problem.

 **Note**	Note: User should comply with the attention and suggestion in this manual. it could bring much easier operation.

Contents

Chapter 1 **Overview**

1.1 Introduction

The 3rd embedded laser control system is one state of arts integrated embedded motion controller from Han's Yueming Laser. The system integrates both motion control and laser control function. The main function of the system is laser cutting and engraving.

This control system is based on the high-speed CPU + DSP + FPGA architecture with excellent performance, simple structure and stable operation. It is developed for the laser processing industry after the research in those key technologies and processes of the industry. Laser processing system is a highly cost-effective product.

1.2 System Function

The main functions and features of this control system can be concluded as follows:

- Dual Processors. Dual processors separate motion control and laser control from peripheral functions, such as HMI and message management. The new architectural greatly improves the control performance and the reliability of the system. More complicated HMI function could be realized.
- Standalone. The control system is configured with 128M+ memory (maximum 2G). By using large on board memory, graphic files with large data can be processed faster by the system.
- Multi Connectors. Abundant connectors are provided, such as COM, Ethernet and USB. The system could read data from either Ethernet or USB.
- Network Control. By using the Ethernet interface, a single host computer can supervise a factory of networked laser cutting appliances. The PC is used for image processing, data transmission, task scheduling, status monitoring, etc. The remaining machines will realize the functions of receiving assignment, machining, real-time information feedback, etc.
- The system can display the work status as well as the actual path. During machining, operations, "Pause", "Continue", "Stop", can be controlled directly on the control panel.
- With "Scale" and "Test" functions, it is convenient to check the position of the material.
- Optimization. Multiple modes of path optimization algorithm are provided.
- Powerful function of motion control.
    - By applying DSP motion control technology, 3-axis linear interpolation and circular interpolation can be realized to machining continuous path. The high accuracy interpolation is independent from the velocity.
    - Pulse output frequency of linear interpolation can work at 256KHz while circular interpolation can reach 160KHz with radial error limited within ±0.5pulse. (For example, when pulse equivalent of the feed axis is 100pulse/mm, the maximum velocity of linear interpolation can reach 2560mm/s, and the maximum velocity of circular interpolation can reach 1600mm/s with accuracy limited within ±0.005mm).
    - Two modes of pulse output, +/-PULSE or PULSE+DIR.

- Detect the limit switches and driver alarm signal in real time. Stop motion automatically when the signal is triggered.
- Capture home and index signal of encoder by hardware. With this feature, high-speed position latching and good repetitive positioning accuracy can be realized.
- Function of velocity override is provided. User can regulate velocity in real time during the motion.
- The velocity look-ahead algorithm guarantees high-speed and smooth motion when handling large number of small line segments.

➢ Power function of laser control:

- Two kinds of LASER control signals are provided to control CO2 LASER and YAG LASER.
- Two control signals provided to CO2 LASER:

(1) LASER ON signal.

(2) PWM signal (or analog voltage, frequency), the maximum frequency can reach 55 KHz and the range of analog voltage is +/-10V.

- Three channels of control signal provided by YAG LASER:

(1) LASER ON signal.

(2) Q pulse signal, with pulse width and frequency configurable.

(3) FPK (First Pulse Killer) signal.

- Three modes to coordinate laser control and motion control:

(1) Power following mode:

In the mode, the output power of LASER varies as the velocity changes. The output power of the LASER decreases in real time as the velocity is low. Besides, user can set the maximum and minimum value of the output power such as to use the linear part of the output power efficiently. Therefore, the consistency of laser machining depth can be guaranteed when machining with changing velocity.

(2) Direct output mode:

In the mode, user can adjust the output power of the LASER arbitrary before each segment. With the function, cutting on different layers or gradient carving can be realized.

(3) Carving or scanning mode:

The special function is used for laser image scanning and the kernel function is finished by hardware. In this mode, high speed and accuracy can be reached.

(4) Delay for laser on or off is provided, and the unit of the delay time is 1μs. The motion delay can be inserted between two path segments or laser on or off.

(5) Laser power output mode: pulse duty ratio, frequency, and analog output.

1.3 System configuration

1.3.1 Hardware configuration

1. 3rd embedded standalone controller.

2. Operation panel (HMI) and its cable.

3. Cables for serial COM and network connect cable.

3rd embedded controller is use to finish function of motion control and laser control.

The operation panel is used to realize human-machine interactive and display.

1.3.2 Software configuration

The control system software consists of software running in the host PC and software running in the standalone controller.

The main function of the host software:

- Receive files of different format.
- Examine the file.
- Convert the file format according to certain protocol and generate exchanging file.
- Set the parameters of motion control and laser control.
- Realize data transmission with lower-end computer and check the status.
- path optimization.

The main function of the standalone controller:

- Receive exchanging file generated in upper-end computer.
- File operation management.
- Analyze the file.
- Parameter configuration.
- Cutting and engraving management.
- Indicate the machining information.
- Human-machine interface management.

Chapter 2 **Installation**

The hardware of the 3rd controller was installed in our machines, and the controller system were installed too. Usually, users needn't re-install control system except it needs to update.

Users need install the host software (SmartCarve4) in the PC. How about install SmartCarve4, please read the SmartCarve4 user manual.

3rd controller use the ethernet network between PC and machine, it doesn't need install any drivers. Users need make sure the network connection be fine.

Chapter 3 **Operation**

3.1 Operation Flow

3.1.1 Data Export Flow

The data format of 3rd controller is *.ymd, which exported by the software of SmartCarve4. Then through the Ethernet or USB disk transfer to the controller. The SmartCarve4 export the *.ymd file as the follow chart:

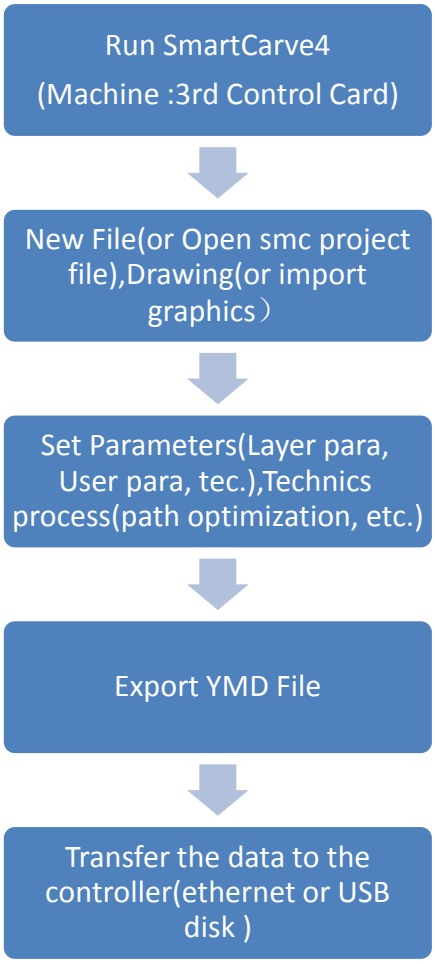


Fig.3-1 Ymd file export flow chart

3.1.2 Controller Operation Flow

Controller system used for the HMI and machine control, its main framework as follows:

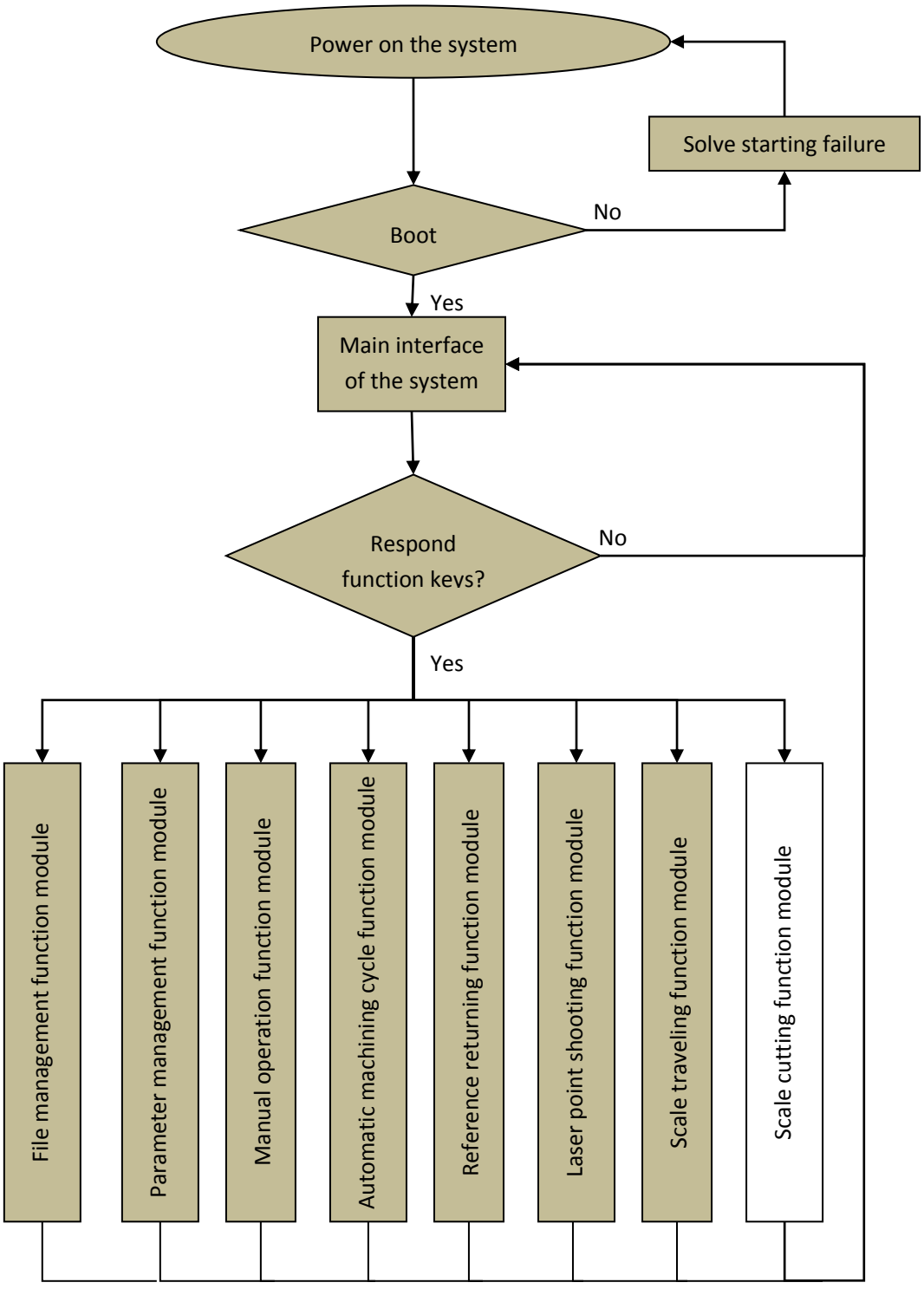


Fig.3-2 3rd Controller Main Frame

Automatic Machining Cycle:

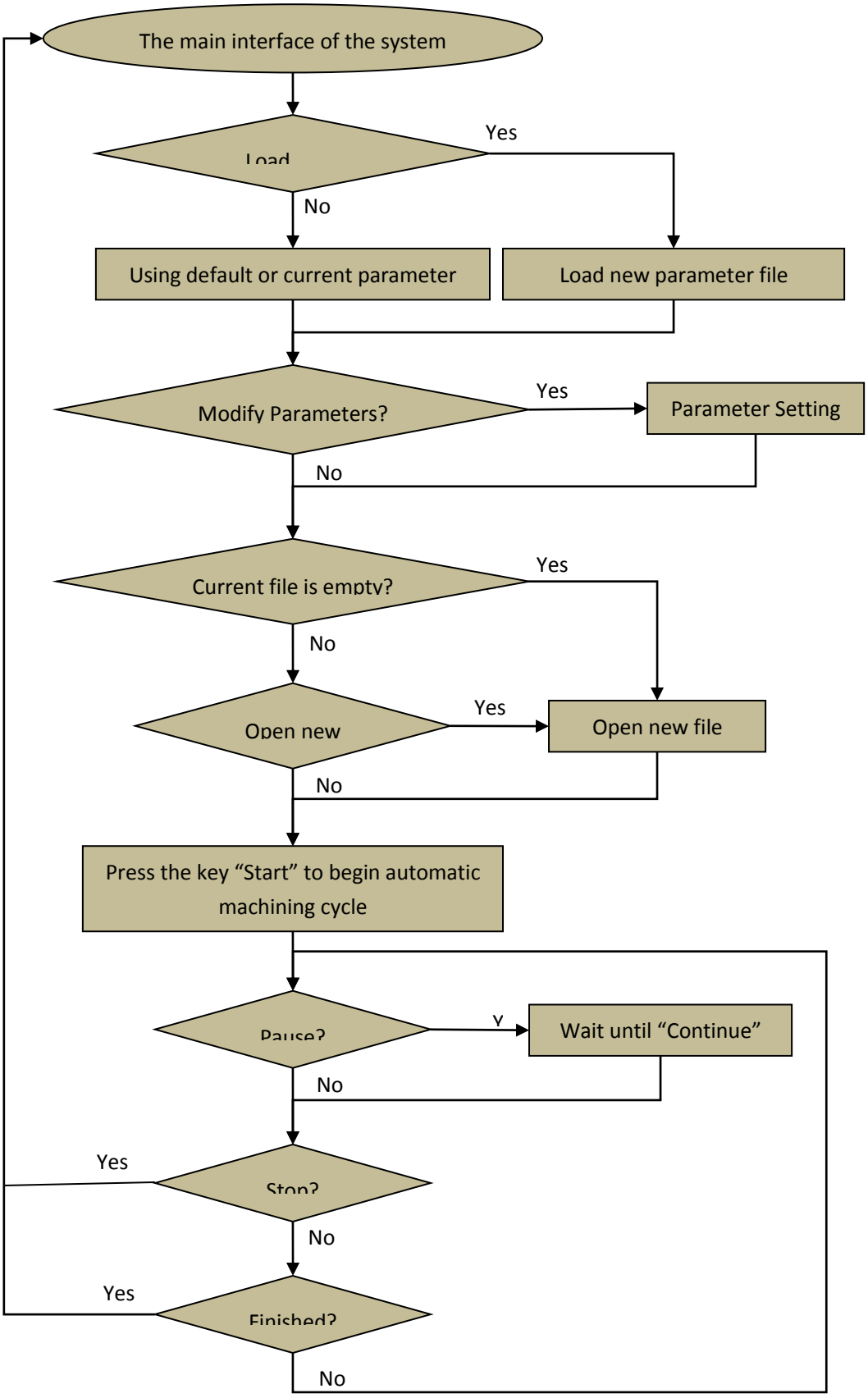


Fig.3-3 Automatic Machining Cycle

3.2 SmartCarve4 use

The 3rd controller host software is SmartCarve4. In this book, we just only exact explain the 3rd controller use. For more information about SmartCarve4, please read the SmartCarve4 user manual.

3.2.1 Layer Parameters

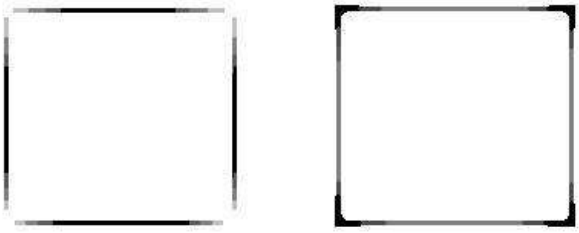
Layer can be taken as a kind of processing technology. A layer is equivalent to a processing technology. There are several kinds of processing parameters in a layer.

Work power:

Set the amount of laser energy during the processing.

Corner power:

Set the minimal (cornering) edge lining energy when cutting.



Small corner power Big corner power

Fig.3-4 Corner Power effect

Work vel:

Set the speed of cutting.

Work acc:

Set the acceleration during the processing.

Note	For more information about SmartCarve4, please read the user manual of SmartCarve4.2.

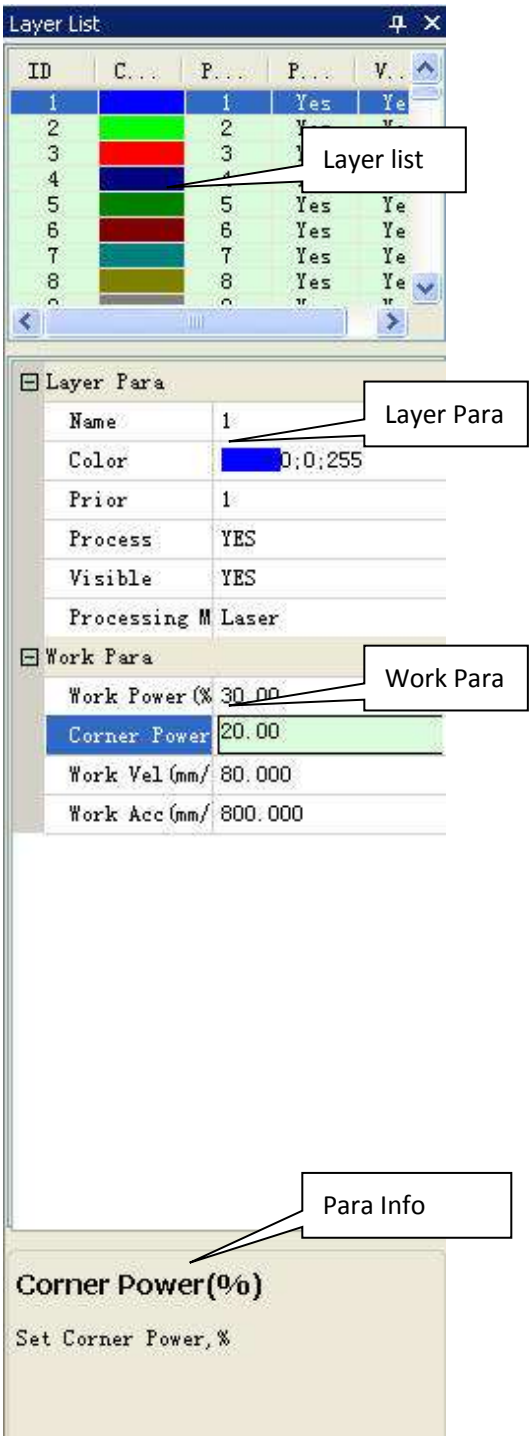


Fig.3-5 Layer Parameters

3.2.2 **Machine Setting**

The machine parameters will determine the machine state, please read this chapter carefully. Machine parameters are the key settings of engraving machine, and they are not allowed to modify under the normal condition. If necessary, a correct backup parameter list should be made before the modification. If the device cannot work normally after the modification, the parameters in backup data could be written to the machine again.

In the main menu, select “Tools”-> “Machine Setting”:

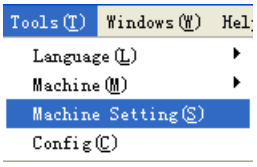


Fig.3-6

The following interface will pop up:

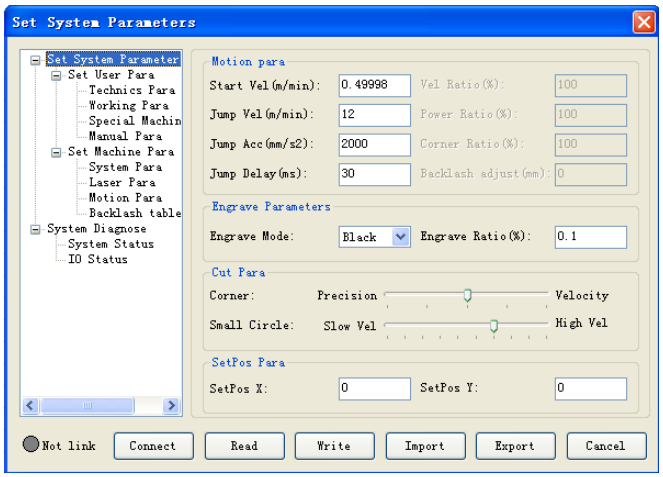


Fig.3-7

The machine tool parameters mainly include system parameter settings and system diagnosis. Click “+” to expand the parameters list.

The button for the following functions:

 : If a connection with the normal that this information will be connected to the success of information.

Connect: Click this button to connect computers and machine. You’d better connect computers and machine before operator the machine.

Read: Ini parameters of the machine into the interface displayed to the parameter of

Write: The corresponding parameter is change the system after writing to the machine

Import: To keep the format file ini to your system interface parameter sets

Export: The system for keeping papers in the format ini

Cancel: Exit Parameters of the system interface

Note	• Must read the machine parameters at first, and then write. • Some parameters can be modified in 3rd controller panel.

3.2.2.1 Technics Parameters

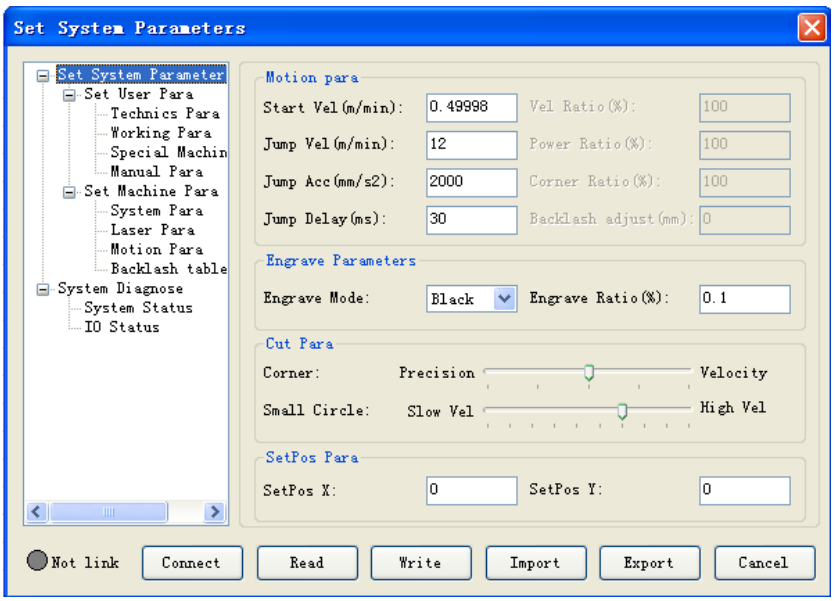


Fig.3-8 Technics Parameters dialog

➢ **Motion Para**

◆ **Start Vel(m/min):**

The step motor requires setting the start frequency, i.e. this parameter (unit: m/min).

◆ **Jump Vel(m/min):**

It is the speed in idle motion section in the course of processing. To improve the processing efficiency, please set it to a larger value (unit: m/min).

◆ **Jump Acc(mm/s^2):**

It is the acceleration in idle motion section in the course of processing. To improve the processing efficiency, please set it to a larger value (unit: mm/s^2).

◆ **Jump Delay(ms):**

The device runs in high speed in idle process. To avoid the trembling during continual cutting, please set this parameter.

◆ **VelRatio:**

Set the parameter of velocity ratio, which affects all the speeds of the system;

- **Power Ratio:**

  Set the processing power ratio, which affects the processing power output of all processing;

- **CornerRatio:**

  Set the corner power ratio of processing, which affects the corner power output of all processing;

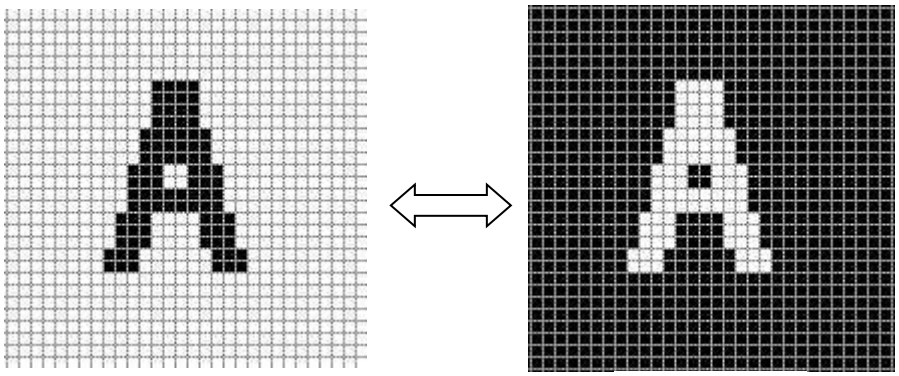
- **Backlash adjust(mm):**

  An adjustment process for the scanning of the reverse of x games, (unit: mm)

➢ **Engrave parameters**

- **Engrave mode:**

  Two options are available: Black or White, the effect as follow:

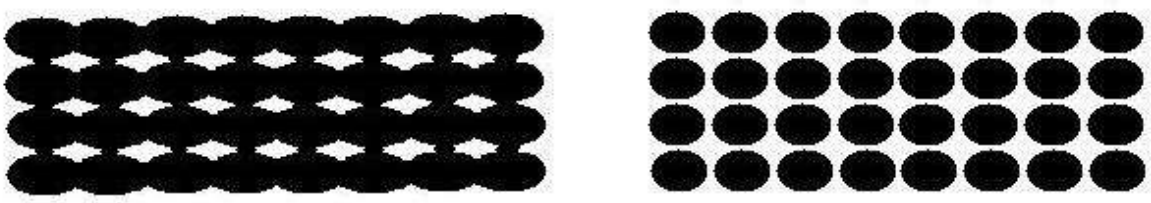


Engrave Black　　Engrave White

Fig.3-9　Engrave mode effect

- **Engrave Ratio:**

  The pulse amount corresponding to distance of 1 mm (unit:0.01% ~100%)



ratio = 2　　ratio = 0.2

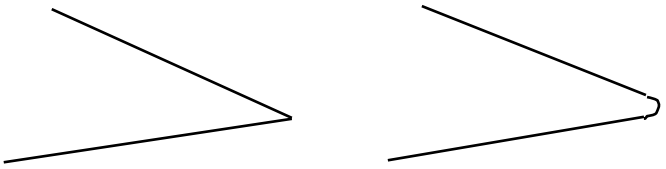
Fig.3-10　Engrave ratio effect

➢ **Cut Para**

- **Corner:**

  precision and velocity settings are available on both sides of the sliding block. If the

sliding block is on the right, the speed at the corner is higher but the precision is lower, while the cut corner is smoother; if it is on the left, the speed is lower but the precision is higher, while the cut corner is sharper.



Precision corner, low speed Smooth corner, high speed

Fig.3-11 Corner process

- **Small Circle:**

  It is necessary to reduce the speed to cut small circle. You can drag the sliding block to select the speed. The smaller this value is, the lower the small circle processing speed is.

➢ **SetPos Para**

It is the processing anchor, which is also called processing reference point and equivalent to the work piece origin. This is a fixed value relative to the mechanical origin.

- **SetPos X:**

  Set the position relative to the X direction of the origin (unit: mm).

- **SetPos Y:**

  Set the position relative to the Y direction of the origin (unit: mm).

3.2.2.2 Working Parameters

The Working parameters dialog as follow：

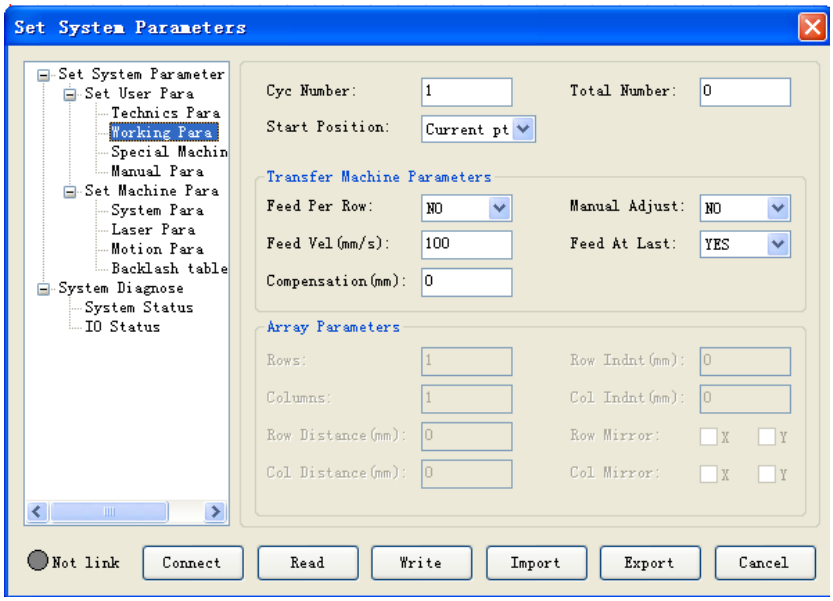


Fig.3-12 Working Parameters dialog

- **Cyc Number:**

  set the number of cut files (1~9999)

- **Total Number:**

  The cumulated processed work pieces of the system

- **Start Position:**

  Set the start point of processing, CurPt: start processing from current point; Set Pt: start processing from locating point

➢ Transfer Machine Parameters

- **Feed per Row:**

  Set whether enable progressive feeding: No: disable progressive feeding; Yes: enable progressive feeding;

- **Feed Vel (mm/s):**

  The speed of feeding (unit: mm/s Range:0~9999.99)

- **Compensation(mm):**

  The length compensation of the entire feeding (unit: mm)

- **Manual Adjust:**

  When the feeding axis has deviation, make the feeding in accurate state through manual alignment.

- **Feed at last:**

  Set whether enable feeding when working finish.

➢ **Array parameters**

- **Rows:**

  The processing number of work pieces every row in array processing (Range: 1-9999)

- **Columns:**

  The processing number of work pieces every column in array processing (1-9999);

- **Row Distance(mm):**

  The row misalignment of work pieces in array processing (unit: mm, -999.99 – 999.99);

- **Col Distance(mm):**

  The column spacing of work pieces in array processing (unit: mm, -999.99 – 999.99);

- **Row Indnt(mm):**

  The Row misalignment of work pieces in array processing (unit: mm, -999.99 – 999.99);

- **Col Indnt (mm):**

  The column misalignment of work pieces in array processing (unit: mm, -999.99 – 999.99);

- **Row Mirror:**

  Used for models with intelliPCInt dual laser heads and the even rows process the graphs in X /Ydirection mirror imaPCI (0: No; 1: Yes);

- **Col Mirror:**

  Used for models with intelliPCInt dual laser heads and the even cols process the graphs in X direction mirror imaPCI (0: No; 1: Yes);

3.2.2.3 Special Machine Parameters

The special machine parameters dialog as follow：

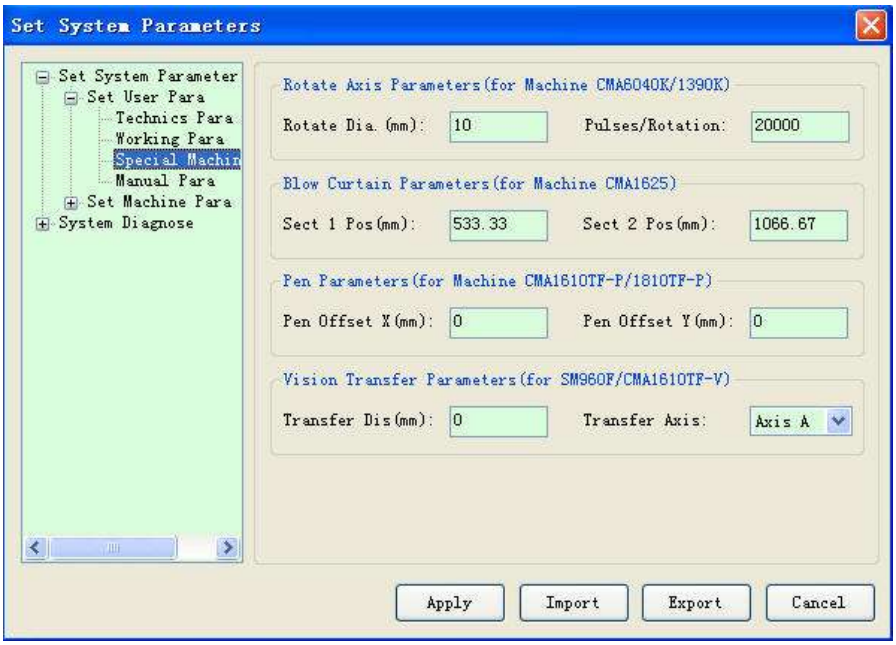


Fig.3-13 Special Machine Parameters dialog

- **Rotation Axis Parameters (for CMA6040K/1390K):**
  - **Rotation dia. (mm):**

    To set the diameter length for the rotation axis.
  - **Pulses/Rotation:**

    To set the pulse number required for every revolution.
- **Blow Curtain Parameters (for CMA1625):**
  - **Position of Switch 1 (mm)**

    To switch on the air curtain when the laser head arrives at the position.
  - **Position of Switch 2 (mm):**

    To switch on the air curtain when the laser head arrives at the position.
- **Pen Parameters (for CMA1610F-P/1810F-P):**
  - **Pen offset X (mm):**

    Departure distance from X to the pen.
  - **Pen offset Y (mm):**

    Departure distance from Y to the pen.
- **Vision Transfer Parameters (for SM960F/CMA1610TF-V):**
  - **Transfer Dis(mm)**:

    Set the parameter about transfer distance， unit: mm.
  - **Transfer Axis:**

    Choose transfer axis.

3.2.2.4 Manual Parameters

The setting interface of Manual is shown in Figure 3-14

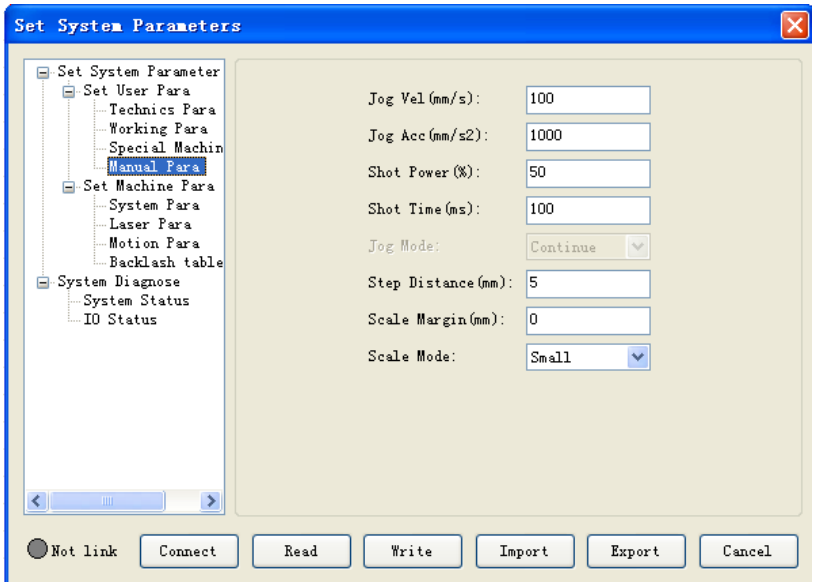


Fig.3-14 Manual Parameters dialog

- **Jog Vel (mm/s):**

  The jog speed (unit: mm/s, 0-9999.99) when the motion axis feeding is controlled in manual mode;

- **Jog Acc(mm/s^2)**:

  The jog acceleration (unit: mm/s^2, 0-9999.99) when the motion axis feeding is controlled in manual mode;

- **Shot Power (%)**:

  The laser energy while spotting (the actual output energy is the sum of this value and the minimum energy) (1-32767);

- **Shot Time(ms)**:

  The laser output time while spotting (unit: ms, 0-99999);

- **Jog Mode**:

  The manual control mode: 0-continuous motion; 1-inching motion;

- **Step Distance(mm):**

  The inching feeding when the manual control mode is inching (unit: mm, 0.01-999.99);

- **Scale Margin(mm)**:

  The deviation (margin) of the actual frame from the graph frame while testing or trimming;

- **Scale Mode**:

  Available in array processing: 0-cut LARPCI; 1-cut SMALL;

3.2.2.5 Set Machine Para

The setting interface of System is shown in Figure 3-20

Fig.3-15 System Parameters dialog

➢ **Home Para**

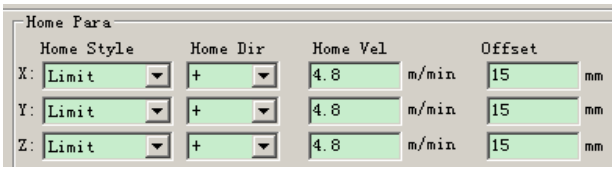


Fig.3-16

◆ **Home Style:**

Four home modes are available: limit, home, limit +Index signal home and Home +Index home, as in Fig. 3-17

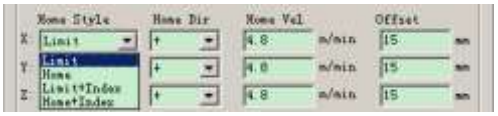


Fig.3-17 Home mode

◆ **Home Dir;**

Two home directions available: positive and negative.

◆ **Home Vel:**

Set the home speed of every axis respectively (unit: mm/s).

◆ **Offset:**

It is the distance that the machine (laser head) drifts relative to the origin switch to avoid the device staying in the origin signal triggering state after collecting the origin

signal (mm). If it is positive, the machine moves certain distance to the reverse direction of home; if it is negative, the machine continues to move to the home direction for certain distance. Generally, this value is positive.

Warming	In Home + Index (or Lmt + Index) mode, install the Home switch between two adjacent Index signals. When Home (Lmt) switch and Index signal superpose, it may cause collection error of Index signals. Han's Yueming has set the machine before delivery. Please modify the parameters under the guidance of qualified personnel.

- **Sensor Para**

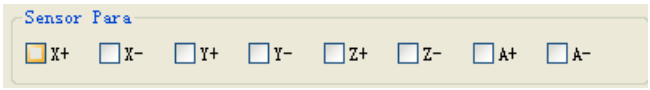


Fig.3-18 Limit switch config

Corresponding card has been connected Limit signal and select the relevant options

- **Other Para**

  - **Start Auto:**

    The operation performed when the device is started. Three options are available: NONE, Go Home and Go Setpos.

  - **Machine type:**

    Two feeding model and standard model are available

  - **Language:**

    Set the language of the controller system: Chinese or English;

  - **Open Cover Protect**

    Two modes are available: Available and invalidate.

  - **Control Mode:**

    Three models are available: Analog, pulse + dir and +/- pulse, as in the figure below. Please select the motor control mode according to the actual condition of the device (note: blue box controller doesn't have analog control mode)

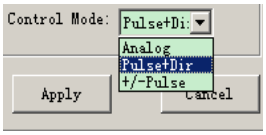


Fig.3-19

3.2.2.6 Laser Parameters

The setting interface of laser is shown in Figure 3-20:

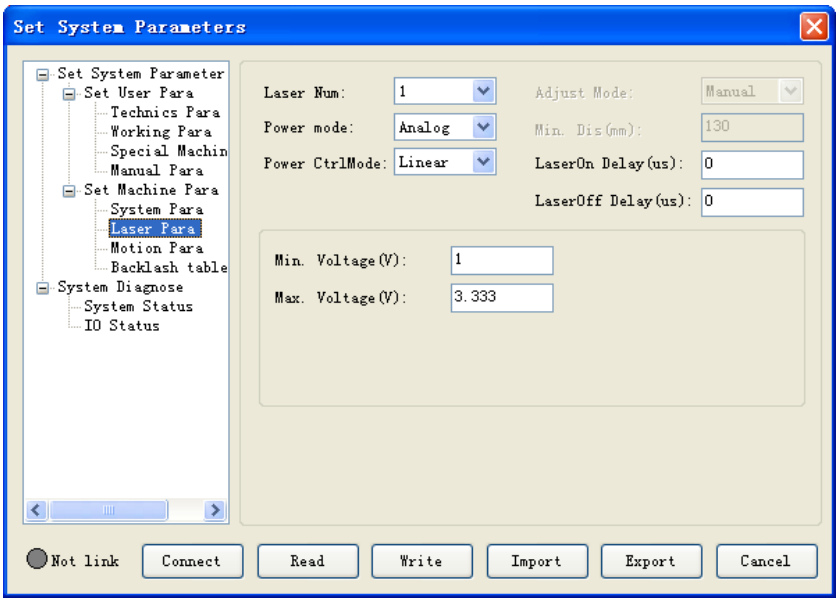


Fig.3-20 Laser Parameters dialog

The setting of laser parameters follows:

- **Laser Num:**

  Two options are available: 1 indicates that only up laser is single laser head processing; 2 indicates that two channels of laser are double laser head processing.

- **Power mode:**

  Three options are available, as in Fig. 3-21:

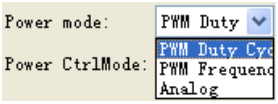


Fig.3-21

A. In duty cycle output mode, the controller outputs pulse quantity to control the laser, and adjusts the laser energy by changing the duty cycle of the pulse. In this mode, you need to set the frequency of PWM. The maximum output frequency of the system can't exceed the maximum frequency of the laser.

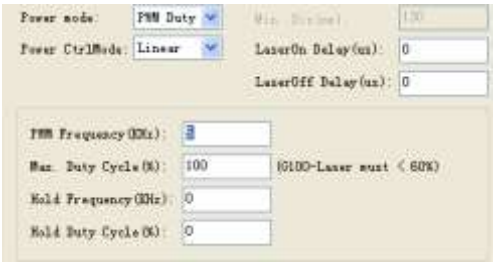


Fig.3-22

B. In frequency output mode, the controller outputs pulse quantity to control the laser, and adjusts the laser energy by changing the pulse frequency.

Fig.3-23

C. In analog quantity output mode, the controller outputs analog quantity to control the laser, and adjusts the laser energy by changing the analog quantity. In this mode, it is necessary to set the pre-voltage and maximum voltage of the laser control power supply, where pre-voltage is the minimum voltage of the energy output port when the laser is idle.

Fig.3-24

◆ **Power CtrlMode:**

Two energy control modes are available: Linear servo and constant value output, as in Fig. 3-25.

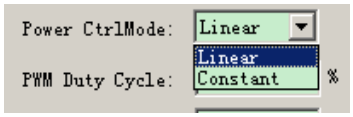


Fig.3-25

The energy corresponds to the cutting power or engraving power in “Setting layer parameters”.In direct output mode, the laser energy outputs constant value. The constant energy value is determined through the cutting power (or engraving power) in “Setting layer parameters”.

◆ **Laser On/Off Delay:**

These two parameters are used for light on/off delay of laser (unit: μs).

Because of the hysteresis from the controller sending motion instructions to actual movement of the motor, it is necessary to set this parameter to ensure the synchronization between laser and the motor motion during laser cutting in process.

3.2.2.7 Motion Parameters

The setting interface of motion parameters is shown in Figure 3-26:

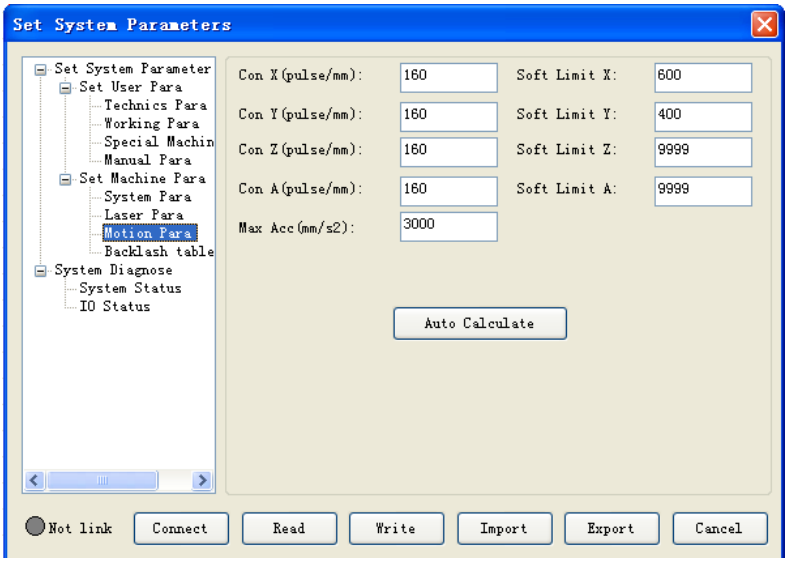


Fig.3-26

- Set the Con X, Y, Z and A pulse equivalent of the device respectively (unit: pulse/mm).

Whether the pulse equivalent is correct determines whether the actual position of the motion is correct. The user is recommended to keep the pulse equivalents of con X and Y consistent while mechanical designing. This parameter sets the equivalent of every axis respectively to trim the mechanical motion error.

To let the user calculate the pulse equivalent conveniently, this software provides the automatic equivalent calculation function. Click the "Auto Calculate" button to pop up the dialog:

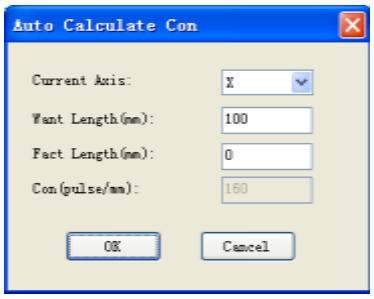


Fig.3-27

The procedure follows:

(1) The user selects the axis to calculate the pulse equivalent first, and enter the Want Length L (default: 100mm);

(2) Move the selected axis for L distance through "STEP JOG" function in lower computer;

(3) Measure the actual inching distance of the axis with a rule, and enter this value into the edit box of Fact Length;

(4) Click the "OK" button and the software calculates the pulse equivalent of current axis.

◆ **Soft Limit(mm)**

Set the mechanical area, which is equivalent to soft limit function. (Range: 0~9999.99)

3.2.2.8 Backlash table

Function: Set the reverse clearance during cutting processing, which is shown in Figure 3-28 below:

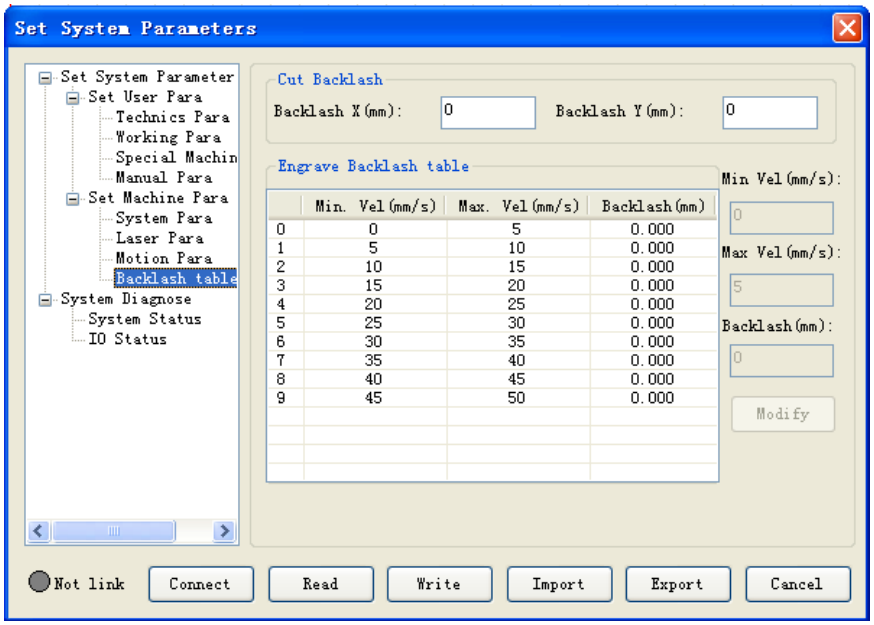


Fig.3-28

The reverse clearance depends on the mechanical precision and response speed of the laser. Generally, it is possible to set one group of reverse clearance value (default: 0) because the speed doesn't change obviously during cutting processing. During engraving processing, since the speed value and the reverse clearance change obviously, it is necessary to set according to the table.

3.2.2.9 System Diagnose

This function is not applicable to the 3rd controller.

3.3 Controller system Instructions

The lower-end system is operated through the operation panel, and the interface is shown as follow:

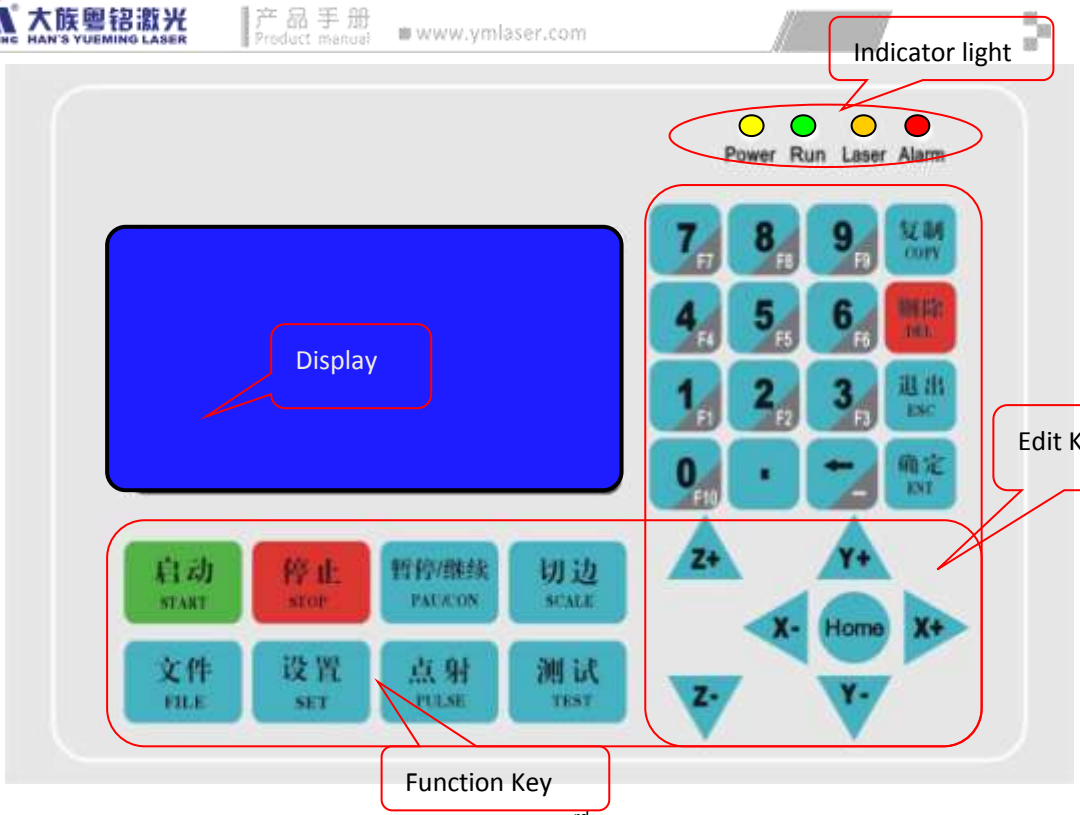


Fig.3-29 Operation panel of 3rd controller system

3.3.1 Light

There are four lights on the panel, shown as follows, on the operation panel to indicate the current status of the system.

Power on light. It will keep on after the system is powered on normally.

System running light. It will be on when the system is in automatic machining status.

Laser on light. It will be on when the laser-on signal outputs.

Alarm indicator light. It will be on when the system works abnormally or the alarm signal is detected.

3.3.2 Power On and Start Up the System

Please connect the power supply for the equipment in the sequence below:

1) Power on the Control system (embedded standalone laser motion controller);

2) Power on the Motor and driver;

3) Power on the Laser and other devices;

Note: The sequence of power off is reverse to that of power on.

To power on the control system, DC 24V power supply should be switched on. After powering on, the system starts up the embedded laser cutting and carving control system automatically. And the power indicating light is turned on. The staring interface is shown as Fig. 3-30.

Fig.3-30 System Start-up Interface

If the system started normally, it enters main interface of the system, as shown in Fig.3-31:

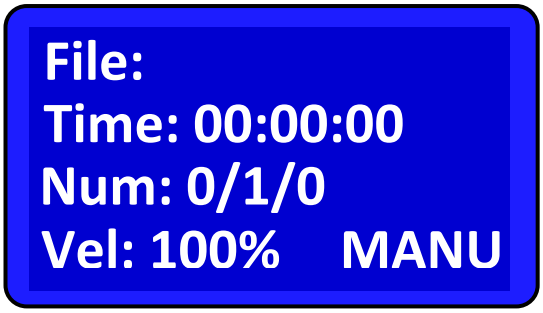


Fig.3-31 System Main Interface

The “File” denotes the name of the selected machining file, User can press the “FILE” button on the panel to select and open a file.

The “Num” item is to display the whole number and the current number.

The “Vel” is to show the override of the work velocity. The default is 100%.

“MANU” is to show the current operation mode is manual mode, not auto mode.

In the right bottom of the interface, this area is used to show the current systems status. The status includes the followings:

- **AUTO:** in auto state, the manual, file and setting operations are invalid;
- **MANU:** in this state, the manual, file and setting operations are valid:
- **PAUS: i**n automatic processing, this state is enabled when the “PAU” key is pressed; press “CON” to continue processing;
- **LIMT:** this state is enabled when the system detects that limit signal is triggered;
- **ALAR:** this state is enabled when the system detects that motor alarm signal is triggered;
- **ERRO:** this state is enabled when the system detects running error;
- **WATE:** this state is enabled when water cooling protection is obstructed.
- **WAOL:** this state is enabled when water cooling is overload.

- **AROL:** this state is enabled when the blower is overload.
- **EXOL:** this state is enabled when the exhaust fan is overload.
- **EMEG:** this state is enabled when the emergency switch is push.

In main interface, under “MANUAL” (or "Inching”) state:

- Press the “**FILE**” key to Enter file management;
- Press the “**SET**” key to Enter parameter management;
- Press the “**PULSE**” key to Enter laser spotting function;
- Press the “**TEST**” key to Enter test (along frame) function;
- Press the “**SCALE**” key to Enter work piece trimming function;
- Press the “**START**” key to Enter automatic work piece processing function and the state switches to “AUTO” state;
- Press the “**Home**” key to return to origin;
- Press the “**X+**”, “**X-**”, “**Y+**”, “**Y-**”, “**Z+**”, “**Z-**”, “**F5**” and “**F2**” to Enter manual feeding function;
- Press “**F0**” to switch between “Manual” and “Inching” mode;
- Press “**F1**” to set current point as the locating point;
- Press “**F4**” to reduce the speed rate of the system;
- Press “**F7**” to increase the speed rate of the system;

A. If the system start is failed and can’t Enter the main interface, the reasons probably are:

a) When the interfaces shown in Fig3-32 appear, the default parameters of the lower system have error.

Fig.3-32 Para error

Reasons for the error:

- The default parameter file “YM_para.ini” is deleted by mistake or the file name is modified;
- The parameter is changed abnormally or the parameter file is damaged.

Solution:

- Download valid parameter file to the lower system with upper software and then restart.

- Copy from USB disk directly

When the interface in Fig.3-33 appears, the initialization of the control system fails.

Fig.3-33 Initialization Fails

Reasons for the error:

- Default parameter setting is invalid;
- Hardware damage or failure of hardware wiring inside the controller.

Solution:

- Re-download valid parameter file;

If step 1 is ineffective, please contact Han's Yueming for maintenance.

B. If the system stays in start-up interface for a long time (>10sec), the system start has fault.

Reason:

- Abnormal system start;
- The configuration file in the system is deleted, damaged or modified abnormally, or the system is damaged;
- Inner hardware fault of the controller.

Solution:

- Cut off the power supply and then re-connect to start the system;
- If step 1 is ineffective, please reload valid system parameter file;
- If step 2 is also ineffective, please contact Han's Yueming for maintenance.

3.3.3 System function description

The function keys include files management, parameter settings, automatic processing, manual operation, etc. In the main interface, you can press the key directly to enter the operation module. In other interfaces, it may be invalid when you press the keys.

3.3.3.1 Manual function

In main interface, under "Manual" state, the "X+", "X-", "Y+", "Y-", "Z+", "Z-", "F5" and "F2" keys are manual function keys. Press these eight keys to control the feeding in positive and

negative directions of the X, Y and Z axes. “F5” and “F2” are used to control the feeding of the fourth axis.

According to the “Manual Mode” setting of system parameters, the manual function has two motion modes, which are continuous and inching. In continuous motion mode, press the Manual key to start the continuous motion of the motor axis, and release the key to stop the motion; in inching motion mode, press the Manual key to move the motor axis for a certain distance, which is specified in parameter “Step Distance”.

The manual function is only available in main interface; in other interfaces, these six are direction keys.

Note	If the feeding direction isn’t consistent to specified motion direction or moves only in one direction, it means that the wire connection or parameter has error. Please adjust the connection or modify the control parameter of the motion axis.

3.3.3.2 Home function

When the system is started, if no home operation is performed, the start position will be considered as the home point by default. In main interface, under “Manual” state, press the “HOME” to perform the home operation or return to locating point. The home point here is the mechanical home and the home mode depends on the setting of system parameters. To return to locating point, it will return to the home point first. The home interface is shown in Fig.3-34:

Fig.3-34 Home Main Interface

In files list interface:

- Press the “Y+”/”Y-” keys to move the cursor and select options;
- Press “ENT” to execute the function that the cursor selects and the homing process is shown in Fig.3-35;
- Press the “STOP” key to stop homing and return to the main interface of the system.

Fig.3-35 Homing Interface

Warning	The user shall confirm that the homing parameter setting complies with the mechanical hardware connection completely, or else the homing function may be invalid and the equipment may be damaged. Make sure that there is no barrier on the worktable during homing to avoid stopping the motion of the equipment.

3.3.3.3 Pulse function

In the main interface, under "Manual" state, press the "PULSE" key to perform the spotting control of laser. The energy of spotting is specified in "ShotPwer" and the time is specified in "ShotTime".

When parameter "ShotTime " is set to 0, the laser is in constant output state, until the user presses the "PULSE" key again to switch off the laser. In constant output mode, the user can perform other operations, for example, move in X and Y direction to cut manually, and the laser switches off automatically when the manual motion stops.

3.3.3.4 File management

In the following interfaces:

- System main interface, not "AUTO" state;
- Parameter management interface;
- Parameter setting interface;
- Parameter list interface;
- Homing interface;

Press the "FILE" button on the operation panel to enter the file management function. The file management interface is shown in Fig.3-36.

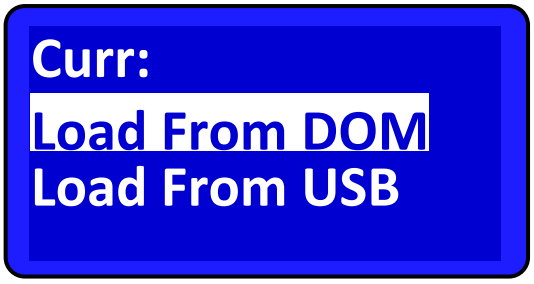


Fig.3-36 File Management Interface

The first line displays the selected file name, and the second and third lines are the target folders, which are local folder and USB disk folder respectively.

In this interface:

- Press the "Y+"/"Y-" keys to move the cursor for up or down selection.;
- Press the key "ENT" to Enter the lower level menu of the item where the cursor on;
- Press the key "ESC" to back to the upper level menu (the main interface of the system).

Press the key "ENT" to enter the list processing files in local or USB disk, as shown in Fig.3-37:

Fig.3-37 File list

If the selected directory is empty, i.e. no pressing file, the interface shown in Fig3-38 appears and returns to file management interface.

Fig.3-38 File empty

If no USB disk is inserted but "Load from USB" is selected, the errors prompt shown in Fig.3-39 appears and returns to file management interface.

Fig.3-39 NO USB disk

In files list interface:

- Press the “Y+”/”Y-” keys to move the cursor for up or down selection;
- Press the direction keys “X+”, “X-” for page turning selection;
- Press the direction keys “Z+”, “Z-” for home-end selection;
- Press “COPY” to Enter menu of file copy function , as shown in fig.3-41;
- Press “DEL” to Enter file delete menu, as shown in Fig.3-47;
- Press “ENT” to confirm and open the selected file; if the file is opened normally, it returns to system main interface automatically; if it fails to open the file, then the error indicating interface would pop up, shown as Fig. 3-40, and the system would return to the main interface automatically.;
- Press “ESC” to return to previous menu (file main interface).

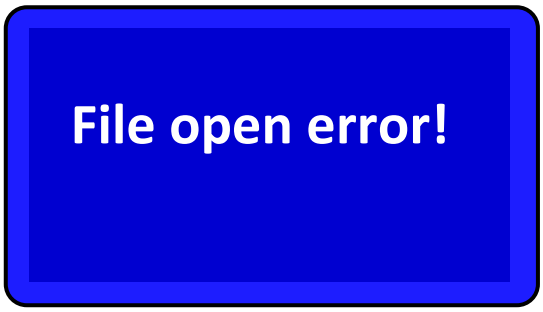


Fig.3-40 File Opening Error

Note	The error is mainly caused by the following reasons: 1: The file is damaged; 2: The file is occupied by other thread (e.g. while file transmission); 3: File format is improper.

The file copy interface is shown in Fig.3-41.

The first line denotes the name of the machining file opened now, the second and third lines denote the folder that needs to be opened, i.e., the local folder and flash disk folder, respectively.

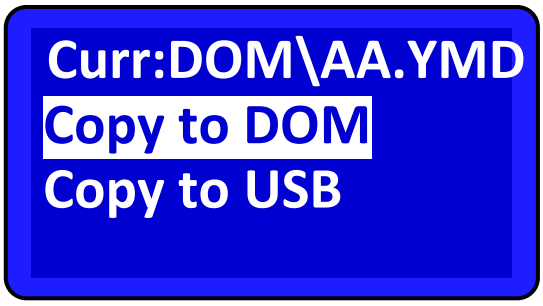


Fig.3-41 File Copy Interface

In file copy interface:

- Press the “Y+”/”Y-” keys to move the cursor and select options;
- Press “ENT” to confirm the selection, Enter the submenu (file copy process interface), as shown in fig.3-42;
- Press “ESC” to cancel copying and return to file management interface.

Fig.3-42 File Copying

When finishing file copying, the interface of "File Copy OK!" would pop up to indicate that the operation has been successful. Then the system would return to the main interface of file management automatically.

If the copy fails, the reason may be:

- The directories of the source file and destination file are same directory, In the case, the error Shown in fig.3-43 will appear;
- If the reading of source file fails, the error Shown in Fig.3-44 will appear; the reason may be that the file is occupied by other thread;
- Writing target file fails and the error in Fig.3-45 will appear; it may be caused that the target directory doesn't have sufficient space or doesn't exist;
- If the memory is insufficient, the error in Fig.3-46 will appear.

Fig.3-43 Illegal Operation

Fig.3-44 Error occurs in reading source file

Fig.3-45 Error occurs in writing file

Fig.3-46 Exception Error

The file delete interface is shown in Fig.3-47.

The first line in the interface is the name of selected file; the second line is the “Delete” option, which is used to delete current file; the third line is the “Delete all” option, which is used to delete all processing files in the selected directory.

Fig.3-47 File Delete Interface

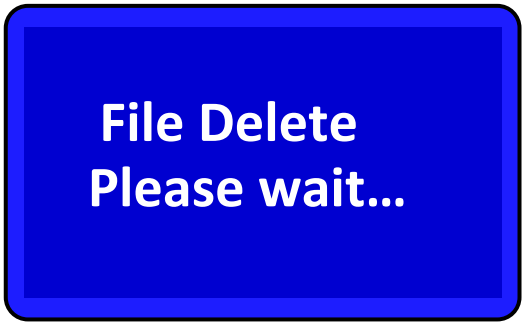


Fig.3-48 File Deleting Process

In file deleting interface:

- Press the direction keys “Y+”/”Y-” to move the cursor for up or down selection;
- Press the key “ENT” to confirm the selection, Enter the submenu (file deleting process interface), as shown in Fig.3-48;
- Press the key “ESC” to cancel deleting and return to file management interface.

After deleting files, the “File Delete OK!” interface pops up and returns to file management interface automatically. If it fails to delete, the interface “delete file fails” pops up and returns to file management interface automatically.

3.3.3.5 Parameter management

In the following interfaces:

- System main interface, but not in “Auto” state;
- File management interface;
- Files list interface;
- File copying interface;
- File deleting interface;
- Homing interface;

Press the “SET” button on the operation panel to enter the parameter management function.

The parameter management interface is shown in Fig.3-49:

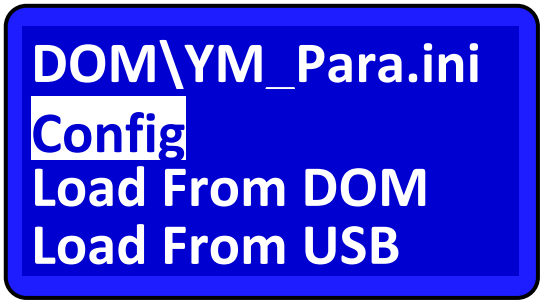


Fig.3-49 Parameter Management Interface

In the parameter management interface, the first line is the selected parameter file name; the second line is the “Parameter setting” option, which is used to Enter parameter setting interface; the third line and the fourth line are used to select the folders (local and USB disk folders) to import parameters.

In this interface:

- Press the “Y+”/”Y-” keys to move the cursor and select options;
- Press “ENT” to Enter the submenu where the cursor locates;
- Press “ESC” to return to previous menu (system main interface).

When the cursor locates at “Load from DOM” and “Load from USB”, press “ENT” to Enter local or USB parameter files list, as shown in Fig.3-50:

Fig.3-50 Parameter file list

In parameter file list interface, it is also possible to manage the parameters (copy, delete or import). The operation is same to file management. Please refer to the operation of related chapters.

Warning	The YM_PARA.ini parameter in local directory is the default parameter of the system and can’t be deleted, or else the system start will fail. Please backup the parameter files for restoration.

Note	Loading new parameter file will reset all the working states of the controller. Please make preparation for the resetting and perform the operation properly after resetting. For the errors caused by newly loaded parameters and system resetting, please take same measures as in system start chapter.

3.3.3.6 Parameter settings

Open the “Parameter setting” option and enter the submenus to select a parameter. The parameter setting submenus are shown in Fig.3-51:

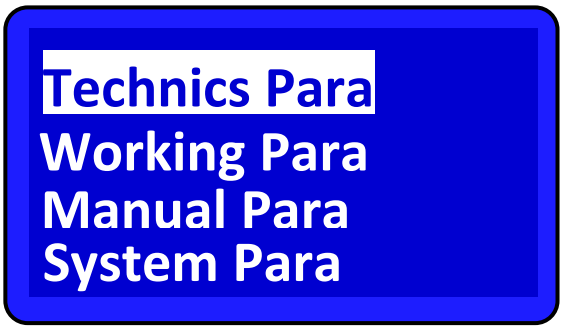


Fig.3-51 Parameter setting

In this interface:

- Press the “Y+”/”Y-” keys to select options;
- Press “ENT” to Enter parameter setting interface;
- Press “ESC” to return to previous menu (parameter management interface).

The parameter setting interface is shown in F1-24:

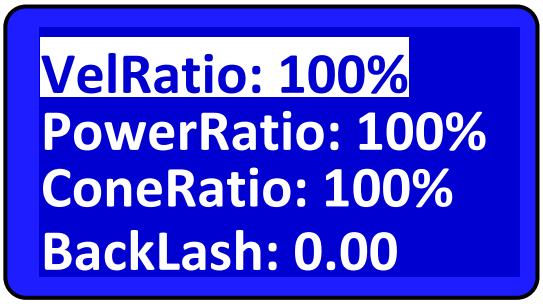


Fig.3-52 Parameters list

In this interface:

- Press the “Y+”/”Y-” keys to select options;
- Press “X+”/”X-” to turn pages;
- Press “Z+”/”Z-” to select home and end;
- Press the number keys (including dot key and Back key) to edit the parameter;
- Press “ENT” to confirm the modification;
- Press “ESC” to return to previous menu (parameter management interface).

The parameters are described below:

1) Technics Para

- **VelRatio:** Set the parameter of velocity ratio, which affects all the speeds of the system;
- **Power Ratio:** Set the processing power ratio, which affects the processing power output of all processing;
- **CornerRatio:** Set the corner power ratio of processing, which affects the corner power output of all processing;
- **BackLash:** Adjust the reverse clearance (unit: mm) of X axis scanning while engraving;
- **JmpDelay:** If the idle running speed is too high while cutting, the machine will twitter, and this parameter is set to stabilize the processing (unit: ms, 1 ~ 1500);
- **EngRever:** Positive engraving and negative engraving.
- **EngRatio:** The pulse amount corresponding to distance of 1 mm, range: 0.01~9999.99;

2) Working Para

- **CutNum:** set the number of cut files (1-9999);

- **Start Pnt:** Set the start point of processing,CurPt: start processing from current point; Set Pt: start processing from locating point;
- **Num.OfRow**: the processing number of work pieces every row in array processing (1-9999);
- **Num.OfCol**: the processing number of work pieces every column in array processing (1-9999);
- **RowDis**: the row misalignment of work pieces in array processing (unit: mm, -999.99 – 999.99);
- **ColDis**: the column spacing of work pieces in array processing (unit: mm, -999.99 – 999.99);
- **RowIndnt:** the Row misalignment of work pieces in array processing (unit: mm, -999.99 – 999.99);
- **ColIndnt**: the column misalignment of work pieces in array processing (unit: mm, -999.99 – 999.99);
- **RowMirroX**:: Used for models with intelligent dual laser heads and the even rows process the graphs in X direction mirror image (0: No; 1: Yes);
- **RowMirroY**: Used for models with intelligent dual laser heads and the even rows process the graphs in Y direction mirror image (0: No; 1: Yes);
- **ColMirroX**: Used for models with intelligent dual laser heads and the even cols process the graphs in X direction mirror image (0: No; 1: Yes);
- **ColMirroY**: Used for models with intelligent dual laser heads and the even cols process the graphs in Y direction mirror image (0: No; 1: Yes);
- **FeedAxis:**Set whether enable progressive feeding: No – disable progressive feeding; Yes: enable progressive feeding;
- **FeedVel:**The speed of feeding (range: 0-9999.99, unit: mm/s);
- **FeedDis:T**he length compensation of the entire feeding (unit: mm, 0-9999.99);
- **MinSpace:** The distance between two laser heads.
- **ManAdjust:** When the feeding axis has deviation, make the feeding in accurate state through manual alignment. Refer to Chapter 2.1.2.2 ManAdjust for the details of this function.
- **TotalNum:** The cumulated processed work pieces of the system.

3) Manual para:

- **JogVel:** The feeding speed (unit: mm/s, 0-9999.99) when the motion axis feeding is controlled in manual mode;
- **JogAcc**: The feeding acceleration (unit: mm/s^2, 0-9999.99) when the motion axis feeding is controlled in manual mode;
- **ShotPwer**: The laser energy while spotting (the actual output energy is the sum of this value and the minimum energy) (1-32767);
- **ShotTime**: The laser output time while spotting (unit: ms, 0-99999);
- **Jogmode**: The manual control mode: 0-continuous motion; 1-inching motion;
- **StepDis**: The inching feeding when the manual control mode is inching (unit: mm, 0.01-999.99);

- **Margin**: The deviation (margin) of the actual frame from the graph frame while testing or trimming;
- **ScaleMod**: Available in array processing: 0-cut LARGE; 1-cut SMALL;

4) System para:

- **StartAct**: The operation executed automatically when the system is started: 0-NONE; 1-GO HOME; 2-GO SetPt;
- **LmtSense** level: Represent the positive and negative limit trigger levels of the four axes with 8 bits: 0-High level trigger; 1-Low level trigger;
- **SnsAlarm**: Enable/disable cover opening function: 0-No; 1-Yes (the cover opening protection is connected with the second input port);
- **IP:** Set the network IP of the lower system (default: 192.168.1.8) and restart is required;
- **X Range:** The travel setting of the axis X; when X axis exceeds this travel, the system will send "Limit" alarm (unit: mm, 0-9999.99);
- **Y Range:** The travel setting of the axis Y; when Y axis exceeds this travel, the system will send "Limit" alarm (unit: mm, 0-9999.99);
- **X Conver:** The unit to calculate between the mm and pulse. This is defined as how many pulses that one mm include. The unit is pulse/mm.
- **Y Conver:** The unit to calculate between the mm and pulse. This is defined as how many pulses that one mm include. The unit is pulse/mm.
- **Z Range:** Travel setting of axis Z (unit: mm, 0-9999.99);
- **A Range:** Travel setting of axis A (unit: mm, 0-9999.99);
- Z **Conver:** The unit to calculate between the mm and pulse. This is defined as how many pulses that one mm include. The unit is pulse/mm.
- A **Conver**: The unit to calculate between the mm and pulse. This is defined as how many pulses that one mm include. The unit is pulse/mm.
- **X SetPos:**Set the position of the locating point of axis X (unit: mm, 0.0-9999.99);
- **Y SetPos:**Set the position of the locating point of axis Y (unit: mm, 0.0-9999.99);
- **language:** Set the language of this system: 0-Chinese; 1-English;

Note	Not all upper software parameters can be modified and set in lower system. If necessary, please set the parameters in upper software and then load into lower system.

3.3.3.7 Starting processing

The automatic processing consists of laser cutting and laser engraving. In both modes, the steps of the automatic processing are same:

- Load parameters;
- Open the data file to be processed;
- Locate the home point of the work piece;

- In system interface, press the “START” key to start automatic processing;
- The system Enters automatic processing circulation module, until the processing completes or the “STOP” key is pressed.

The start point of the processing is set in processing parameters submenu, and two modes are available:

One is the current point: indicate that the system starts automatic processing from the current position of the laser head;

The other is the locating point: in this mode, the user can press the arrow keys on the control panel to move the laser head and press F1 key to locate current point at desired position. Press the “START” button again and the system starts the automatic processing from the point currently located.

If it is not clear whether the processing range exceeds the limit, the user can check the processing range with “TEST” function.

If the user presses the “START” key before valid processing data file is opened, an interface will pop up for the user to select data file, as shown in Fig.3-53, and Enter the file management module automatically.

Fig.3-53 Prompt to open processing file first

When the system enters automatic processing mode, the status bar in the lower right corner will display “AUTO”. As shown in Fig.3-54:

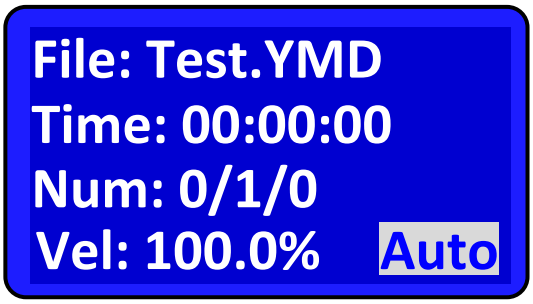


Fig.3-54 Automatic Processing Interface

In automatic processing state:

- Press the “X+” key to increase the speed rate;
- Press the “X-” key to decrease the speed rate;
- Press the “Y+” key to increase the laser power;

- Press the “Y-” key to decrease the laser power;
- Press the “PAUSE” key to hold current processing;
- Press the “CON” key to resume current processing;
- Press the “STOP” key to stop current processing and the system state switches to “Manual” state;

3.3.3.8 Test function

The test function is moving along the frame. Run the test function, and the machine will process the rectangular frames of the work pieces when the laser is off. The interface is shown in Fig.3-55.

Under the conditions below, this function is needed:

- Uncertain whether the work pieces to be processed exceed the processing limit of the machine;
- Uncertain whether the work pieces to be processed are processed in specified range.

In this interface, press “CANCLE” or “STOP” to stop the test and return to main interface of the system. When the test completes, the interface “Test Scale Over!” pops up and return to main interface of the system automatically.

The test speed is same to the speed set in “Manual velocity”; the test acceleration is same to the setting of parameter “Acceleration”.

Fig.3-55 Test Function Interface

3.3.3.9 Scale Cutting

Function: it can be regarded as function of scale traveling with laser on.

When running the function of scale cutting, the device would cut off the rectangle scale of the WorkPiece with laser on. The interface is shown as Fig.3-56.

Fig.3-56 Frame Cutting Function Interface

The user needs this function to cut off the work piece when it has been processed. In this interface, press “CANCLE” or “STOP” to stop the frame cutting and return to main interface of the system automatically. When the frame cutting completes, the interface “Cut Scale OK!” pops up and return to main interface of the system automatically.

The speed of frame cutting is same to the speed set in parameter “Manual speed”; the cutting acceleration is same to the value set in parameter “Acceleration”; the laser energy of frame cutting is same to the value set in parameter “Following ratio”.

Note	The function of scale cutting can be used for device test. The phenomenon that the power of the scale is non-uniform or the scale is unclosed in the corner is always caused by setting the parameters incorrectly: If the scale is unclosed in the corner, user can increase the value of parameter “Minimum power” or “Delay time for laser off”.

3.4 Data transmission

The laser embedded control system is an independent laser cutting and engraving control system, which transmits data through the USB port or Ethernet port. The data to be transmitted are usually the processing data files (YMD file) and parameter files (ini file).

3.4.1 Net transfer

Application of network transmission function:

After saving the drafted figure as *.ymd file or exporting the parameters as *.ini file, click the network transmission button  in toolbar, and the following dialogue box will pop up:

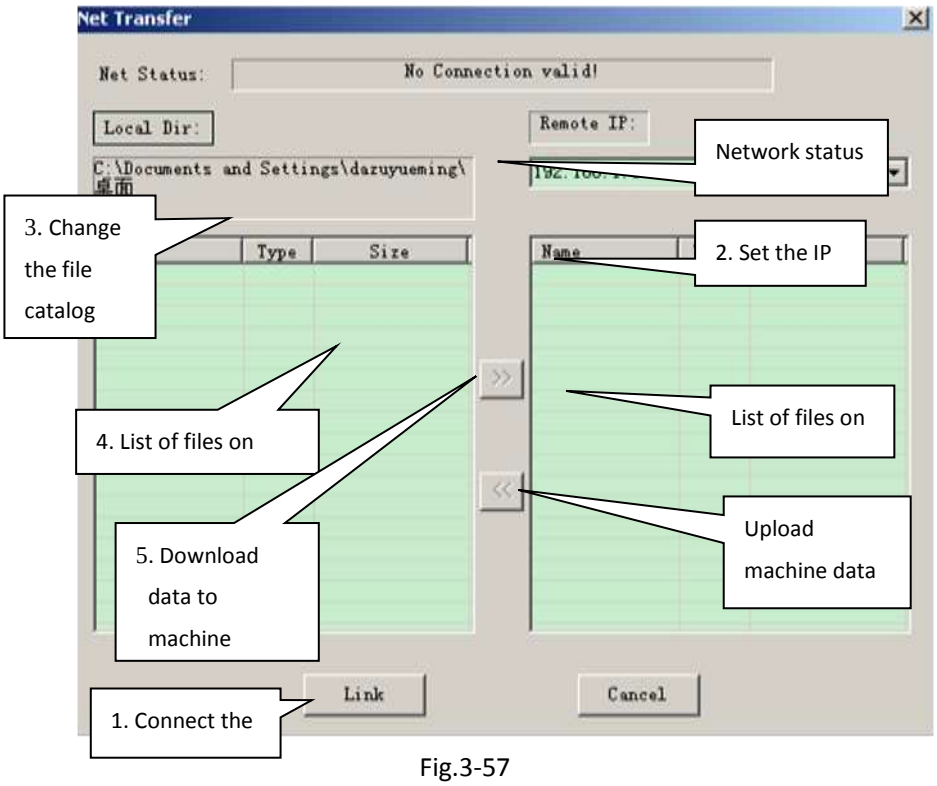


Fig.3-57

Steps to download files to machine:

- Link the network. If the network is successfully linked, network Linked information will be shown in the network status area.
- Set the IP address. It is default as “192.168.1.8”. The IP of machine should also be set as this value.
- Change the file catalog in “Local Dir”. In the left file list, there show the figure data files and parameter files.
- Select the file(s) and click the right double-headed arrow to download them to machine.

Steps to upload files to computer:

- After Linking to the network, the current files on machine will be shown at the right file list.
- Select a file and click the left double-headed arrow to upload it to the current catalog on the computer.

3.4.2 **USB disk transfer**

A. In case that the system is started normally:

The system is equipped with a USB interface to transmit data with USB memory disk. The system supports PNP of USB disk.

To transmit the processing data files in the USB disk to local disk:

- Insert the USB disk;
- Enter File Management Interface;

- Move the cursor to option “Read files in USB disk”, and press “ENTER” to Enter the data files list in USB disk;
- Move the cursor to the file to be transmitted and press “COPY” to Enter file copy interface;
- Select the option “Load from Disk” (default) and press “ENT”.

B. When the system can’t be started normally and requires reloading parameters:

- Copy the processing files to the root menu in the USB disk;
- Connect to the USB interface and the system will recognize the files automatically;
- Press the “START” button;

 Warning	The default directory for reading the USB files (including processing data files and parameter files) is the root directory and doesn’t support submenu. The possible errors and reasons of copy function are described in Chapter 3.3.3.4. The USB disk only supports FAT format and the maximum capacity is 2GB.

To transmit the processing data files in local disk to the USB disk:

- Insert the USB disk;
- Enter File Management Interface;
- Select menu “Load From USB” (default) and press “ENT” to Enter local data files list;
- Move the cursor to the file to be transmitted and press “COPY” to Enter file copy interface;

The transmission of data file is same to the transmission of data files. Please Enter parameter management and perform operations.

Chapter 4 **Samples**

In case of mass production, this function will improve the efficiency significantly. The feeding function is designed for flexible materials specially. Before cutting, please check the flatness and trimness of the material.

The third controller supports four channels motor, which are X, Y, Z and A; axis A is used by mesh belt, axis Z is used by feeding roller in case of single laser head and by second cutting head in case of double laser heads.

4.1 Single laser head

Single laser head processing means that only one laser head is used for processing.

4.1.1 Array graph processing

During array graph processing, two feeding modes are available, which are progressive and breadth. Suppose that the graph to be processed is shown in Fig.4-1:

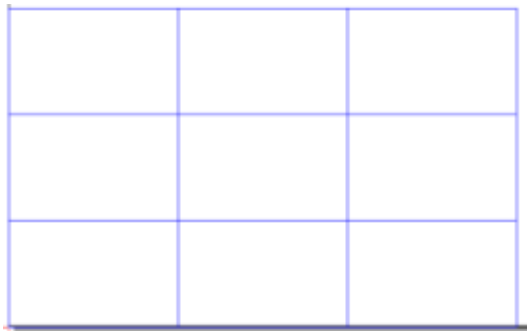


Fig.4-1

The steps follow:

A. Draw a 600 wide and 600 high graph in the upper computer software, as shown in Fig.4-2:

Fig.4-2

Set the axis X travels for the graph area and machine breadth to 1600mm and set the axis Y travels to 1000mm. (“Tool” – “Machine setting” – “set System parameter” – “Set Machine Para” – “System Para” – “soft limit”).

B. Press “SET” on the control panel to Enter “parameter management”:

Select “Config” and Enter “Working Para” in the submenu;

Select 3 in “Num.ofRow”;

Select 3 in “Num.ofcol”;

Warning	The setting of this parameter is valid for this operation only. When the system is restarted, please reset this parameter. If you want this parameter setting take effect permanently, please set in upper computer. (The array setting is described in Chapter 2.8.10 Array Conversion in the upper computer software).

Operate in the following two feeding modes:

4.1.1.1 Progressive feeding

In this feeding mode, please set the following parameters:

Select “Parameter settings” and Enter “Processing parameter setting” in the submenu;

Select “NO” in option “ManAdjust”;

Select “YES” in option “FeedAxis”.

While processing, the machine feeds one row of material after cutting one row until the cutting completes.

4.1.1.2 Breadth feeding

In this feeding mode, please set the following parameters:

Select “Parameter settings” and Enter “Processing parameter setting” in the submenu;

Select “NO” in option “ManAdjust”;

Select “NO” in option “FeedAxis”.

Since the second row of the graph exceeds the cutting breadth of the machine, when the first row has been cut, the machine feeds a breadth of material (i.e. 600mm); then, it cuts the graph in the second breadth and feeds another breadth, and then cut the third row.

4.1.2 Mixed layout graph processing

The processing of mixed layout graph is only suitable for the feeding according to breadth. The breadth parameters can be set in system parameters, which have been described above.

4.1.2.1 Automatic FeedAxis

For automatic feeding, the user only needs to select graph, set the parameters and start the machine, and the machine will feed the material after cutting a breadth. If the feeding system of the machine has error, the user can use manual alignment to get accurate alignment.

The graph of automatic feeding is described in two conditions:

1. The graph exceeds the breadth of the machine, but single curve doesn’t exceed the breadth, as shown in Fig.4-3:

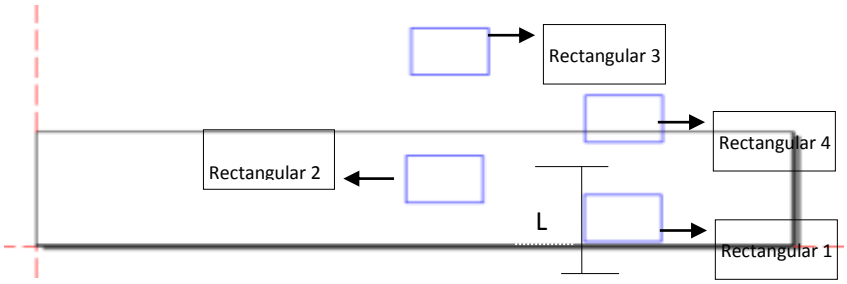


Fig.4-3

a) The machine cut rectangular 1 and 2 in the first breadth, as shown in Fig.4-4:

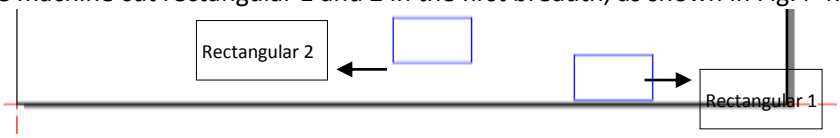


Fig.4-4

b) The machine feeds material automatically (the feeding length is the L in the figure) and then cut the rectangular 3 and 4 in the second breadth, as shown in Fig.4-5:

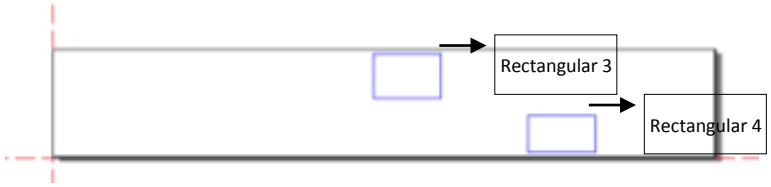


Fig.4-5

2. The figure exceeds the breadth of the machine, and single curve may exceed the breadth, as shown in fig.4-6:

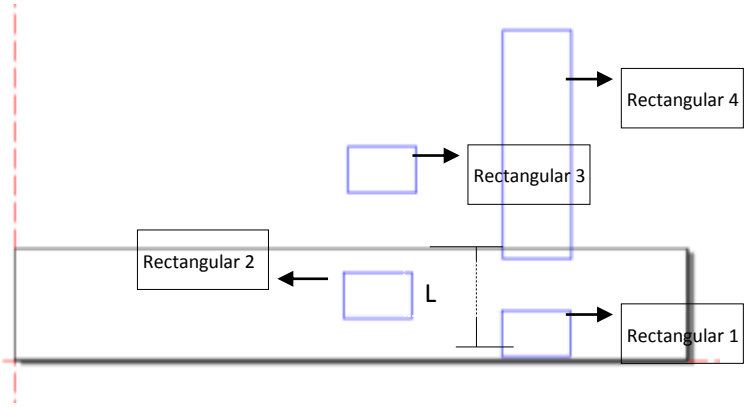


Fig.4-6

a) The machine cut rectangular 1 and 2 in the first breadth, as shown in Fig.4-7:

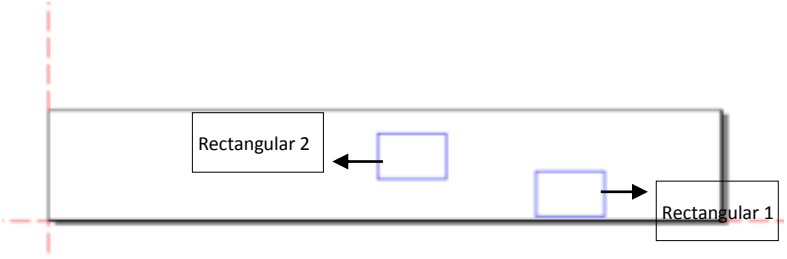


Fig.4-7

b) The machine feeds materials automatically (the feeding length is the L in the figure) and then cut part of rectangular 3 and 4 in the second breadth because the length of rectangular 4 exceeds the machine breadth, as shown in fig.4-8:

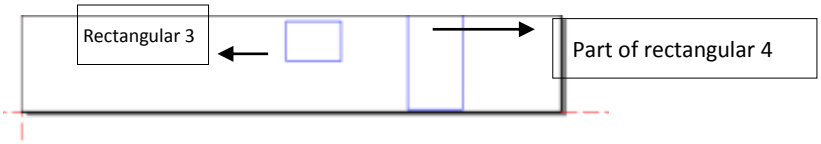


Fig.4-8

c) The machine feeds materials again automatically and finally cuts the left part of rectangular 4, as shown in fig.4-9:

Fig.4-9

4.1.2.2 Man Adjust

It is mainly used for cutting and feeding according to breadth, especially when the graph size exceeds the cutting breadth of the machine. Due to the error caused by feeding belt, it is necessary to locate the graph cut in previous breadth to actually desired position accurately after feeding in manual mode.

The user selects graph, sets parameters, and starts the machine; the machine will pause and wait for the user to align manually after cutting a breadth.

The specific operation follows:

1) Draw the figure in upper computer software, download to the machine and load the graph.

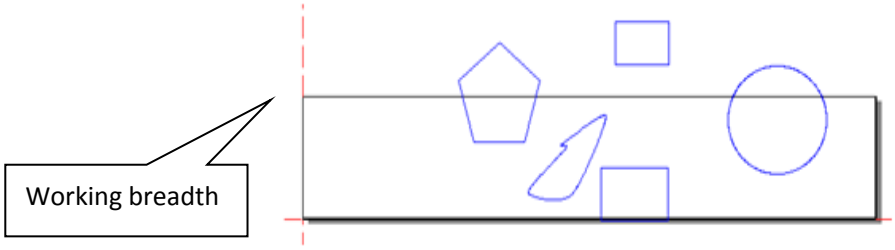


Fig.4-10

2) Press “SET” on the control to Enter “Parameter Settings

Select “Config” and enter the submenu “Working Para”;

Select “YES” in "Manual alignment”:

3) Start the machine

4) In the current working breadth, the machine cuts a part of the graph, as shown in fig.4-11:

Fig.4-11

The laser head moves to the position near the start point of axis X; when the laser head stops, the user can press the “PULSE” key to mark in this position.

5) Press the “PAU/CON” key to start feeding, the feeding platform and the laser head move a certain distance forward, and the user should press the “PULSE” key again to check whether the mark made in Step 4 coincides with this mark.

If not, press the direction keys to move the laser head, until the spotted mark coincides with the mark made in Step 4.

6) Press the “PAU/CON” key and the machine resumes the cutting, until the left graphs are processed.

The left part of the graph is shown in fig.4-12:

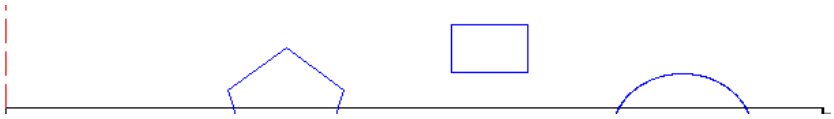


Fig.4-12

Now, the splicing of the graphs completes.

4.2 Dual laser heads

In case the laser channels are two, dual laser heads work. In this mode, the software will assign the graphs to two laser heads and cut automatically.

4.2.1 Processing of array graph

Refer to Chapter 2.8.10 of the upper computer software for the generation and editing of array graphs and leftover materials.

Suppose that the user sets the graph to 4 rows and 5 columns in the upper computer software, and both the row spacing and column spacing are 2mm, as shown in fig.4-13:

Array figure

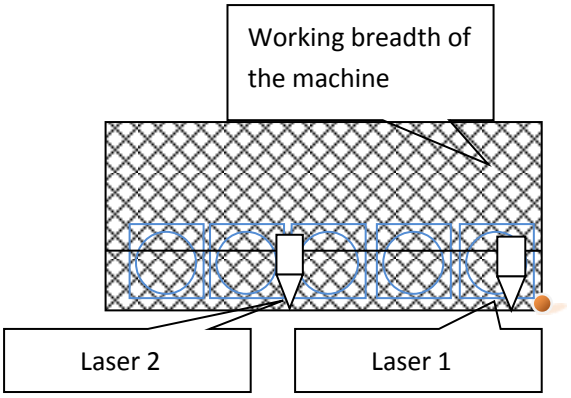


Fig.4-13

Set the following parameters in the lower computer:

Select “Config” and Enter the submenu “Working Para”;

Select “NO” in “ManAdjust”

Note	If the user wants to trim current figure, please modify the “Array rows”, “Array columns”, “Row spacing” and “Column spacing” on the control panel of the lower computer. But the settings of this parameter are only valid to this operation. The parameters should be reset when the system is restarted. To make the parameter settings take effect permanently, please set in upper computer.

4.2.2 **Processing of mixed graph**

For our machine speciality, two laser head use the same one beam in Y axis motion. So user need layout the mixed graph in half area of the machine of X direction, and set the panel parameter “cols” value to “2”. Then it can work mixed graph with two laser head.

Chapter 5 **Troubleshooting**

	Trouble	Reason	Handle
1	All the four indicating lights do not work after the system is powered on.	● 24V or 5V power supply or the circuit is damaged. ● Power supply module of the controller is damaged.	● Check the power supply and the circuit. ● Contact Han's Yueming Laser Technology for service.
2	Only the 24V light is on after the controller is powered on.	● Power supply module of the controller is damaged.	● Contact Han's Yueming Laser Technology for service.
3	The LCD screen does not have background light and the power indicator light is off after the system is powered on.	● Wiring of the operating panel is damaged or loose. ● Wiring inside the controller is loose.	● Check the wiring of the operation panel ● Contact Han's Yueming Laser Technology for service
4	The keys cannot work or the LCD works abnormally.	● The system software does not started up correctly. ● Wiring of the operation panel is damaged or loose.	● Restart the system ● Check the wiring of the operating panel.
5	The system stays at the staring interface for a long time and has no any response at it starts up.	● The system starts up abnormally. ● The internal configuration file is deleted, damaged or modified incorrectly, or the system has been damaged. ● Internal hardware failure of the controller	● Restart the system ● Reinstall the system ● Contact Han's Yueming Laser Technology for service
6	Default parameter error is prompted after the system starts up.	● The default parameter file "G.L_Para.ini" is deleted or the file name is modified. ● Certain parameter is modified incorrectly of the parameter file has been damaged.	● Reload correct parameter file to the lower-end system through the upper-end software, and restart the system.
7	"Initialization fails" is prompted after the system starts up.	● The default parameter is set incorrectly. ● The internal hardware wiring failure of the controller or the hardware is damaged	● Reload correct parameter file. ● Contact Han's Yueming Laser Technology for service

	Trouble	Reason	Handle
8	When connecting with the servo motor, the motor would move slowly after powered on.	● Motor parameters are set incorrectly. ● Wrong wiring between the controller and the motor driver.	● Check the wiring between the controller and the motor driver. ● Set correct parameters of the motor.
9	The motor is out of control or flying when connecting with servo-motor.	● Wire phase A and phase B incorrectly. ● Control mode of the controller and the driver are not matched.	● Set correct parameters of the motor (please refer to the specification of the motor and the driver).
10	The motor cannot run or just run towards single direction.	● Control mode of the controller and the driver are not matched. ● Wrong wiring between the controller and the motor driver.	● Set correct control parameters ● Check the wiring of the motor
11	Unable to open files of the flash disk, system will be down when accessing the flash disk.	● The flash disk is incompatible with the controller	● Change another flash disk
12	The upper-end software and lower-end system cannot be connected through network.	● IP and the ports are set incorrectly. ● The network line does not work.	● Check configuration of IP and the ports. ● Check the network line.
13	When machining closed curve, the curve is not closed.	● The minimum power of laser is set too low. ● The delay time for laser off is too short.	● Set correct machining parameter.
14	The laser power is non-uniform during cutting process	● The following ratio is set incorrectly.	● Set correct machining parameter.

Chapter 6 **Appendix**

6.1 Appendix1: System update

Use the USB disk to update the machine system

Step 1. Copy the update file "Lasernew.new" to the USB disk root directory (Note: the USB disk must be **FAT** format, the capacity < 2GB);

Step 2. Insert the USB disk to the 3rd controller, boot the machine, the panel face will be shown as:

Step 3. Press "START" key to enter the update face as the follow:

Step 4. Wait for the progress bar, and then it will be shown the success interface as follow:

Step 5. Please remove the USB disk, and reboot the machine, update is finish.

Postface

Final explanation right belongs to Hans YueMing Laser Technology Co. Ltd of Guangdong. We reserve the right to make changes on our machines without notice to users.

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