PLC 全自动耦合系统

使用说明

PLC Automated Wave-guide Alignment System

Usage Instructions

V1.11

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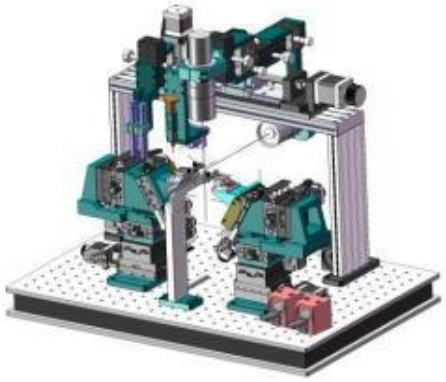
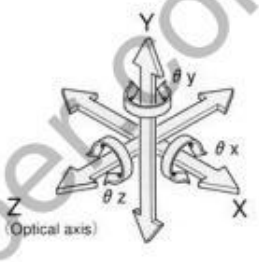
1. 概述 Overview

该系统可用于多种无源器件的对准封装，只要更换夹具，就可以应用于这些器件。例如：AWG、Coupler、Splitter、VOA 等等。

This system can be used for alignment packaging of various passive components, as long as the holders replaced, it can be applied to these devices. For example: AWG, Coupler, Splitter, PIC, VOA and so on.

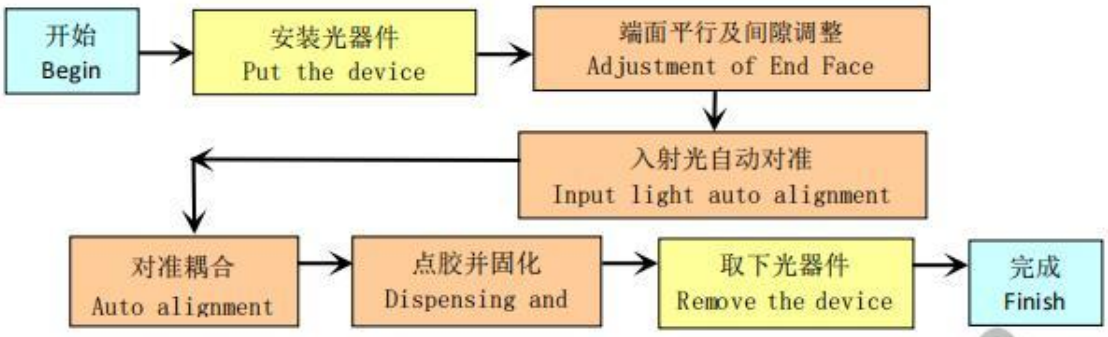




1.1 系统特点

- 微米级的调节精亚度。
  Sub-micron level adjustment accuracy
- 采用特殊合金材料来制造夹具等，大大减少了漂移的可能。
  Using alloy materials to manufacture holders，greatly reduces the possibility of power drift.
- 使用自主产权的接触感知技术，可定量的调整器件端面平行性和端面间隙，使对准更加可靠准确，大大减少插损和 UV 胶不均的可能。
  Using proprietary contact sensing technology, quantitative adjustments can be made to the parallelism and end clearance of device ends, making alignment more reliable and accurate, significantly reducing the possibility of insertion loss and uneven UV glue.
- 功能强大的软件，实现一机控制 2 工位的功能。
  Powerful software，can control 2 systems by one computer。
- 方便的上端与后端观察系统，利于更好的观察器件。
  An easy-to-use upper and rear observation system, facilitating better observation of the device.
- 自动初始光查找，方便操作，提高效率。
  Automatic initial light search, convenient operation, and improved efficiency.
- 自动点胶及 UV 固化。
  Automatic dispensing and UV curing.
- 模块化设计，易扩展和更新，可根据客户的特殊要求定制系统。
  Modular design, easy to expand and update, and custom systems can be provided based on customer-specific requirements.

1.2 对准封装基本流程 Basic process of alignment packaging



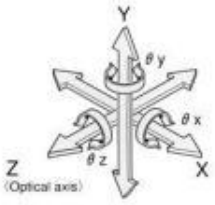
1.3 系统主要组成

1) 对准部分 Alignment Unit
2) 输入输出电动六轴微调架及控制器 Input/output motorized 6-axes stages and the controller
3) 光纤列阵夹具 FA Holder
4) 上端和后端观察部分 Upper and back-end observation unit
5) 变焦镜头 Zoom Lens
6) CCD 摄像机 CCD camera
7) 监视器 Monitor
8) 相应微调架 The stages
9) 光源 Light source
10) UV 点胶及固化部分 UV curing unit
11) 光源、光功率测量部分 Light source, power meter unit
12) 防振台、仪器支架 Vibration Isolation Table, Instrument Bracket
13) 对准及控制软件 Software
14) 计算机及插卡 Computer and the motion control card

1.4 对准单元

对准单元是整个系统的核心，也是该系统精度控制的关键所在。输入输出端所采用的是两组精密六轴微调架，其规格如下表所示。

The alignment unit is the core of the entire system and is crucial for precision control. At the input and output ends, two sets of precision six-axis fine-tuning stages are employed, with specifications outlined in the table below.



	Axis	Motorized/Manual	Travle	Resolution
Input/Output Stage	X	**Motorized**	50mm	0.1μm/pulse
	Y	**Motorized**	20mm	
	Z	**Motorized**	50mm	
	θx	**Motorized**	±8°	0.0015°/pulse
	θy	**Motorized**	±8°	
	θz	**Motorized**	±8°	
Observation Unit	Z	**Motorized**	200mm	

坐标轴的方向定义：光纤的光线方向为 Z 轴，X 轴为前后方向，Y 轴为升降。各轴，在安装连线时，按照标签连接即可。

Coordinate axis direction definition: The direction of the fiber optic light is the Z-axis, the X-axis is the front-back direction, and the Y-axis is the up-down direction. When installing the cables, connect them according to the labels on each axis.

1.5 夹具单元 Holder Unit

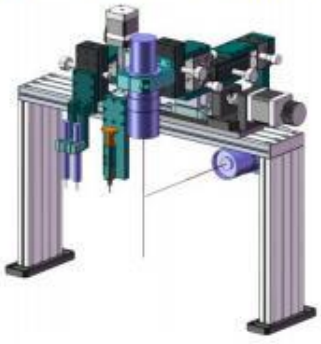
在无源器件对准系统中主要是使用光纤夹具、波导夹具和 FA 夹具。如果使用的是标准的商业化器件做封装的话，一般光纤与 FA 的夹具是相同的。

In the passive alignment system, the main tools used are fiber holders, waveguide holders, and FA holders. If standard commercially available components are used for packaging, the fixtures for fiber and FA are usually the same.

注意，在装器件时，尽量把器件靠紧各个靠面，以保证装的一致性。

Note that when mounting components, try to snugly fit them against each other to ensure consistency in mounting.

1.6 观察单元 Observation Unit



观察系统主要是用来观察对准时器件的上端面和后端面状况的。主要是由显微变焦镜头、CCD 摄像机、监视器和光源组成，还有微调架可以对两个镜头分别进行三个方向的调节。

The observation system is mainly used to observe the condition of the upper and rear surfaces of the components during alignment. It mainly consists of a microscope zoom lens, a CCD camera, a monitor, and a light source. There is also a fine-tuning frame for adjusting the two lenses in three directions each

镜头放大倍数（The magnification factor of the lens） = 光学放大倍数 (The optical magnification factor)
× TV放大倍数(TV magnification factor)
= 46~291倍(1/3″CCD,19″Monitor)

镜头工作距离 (The work distance of the lens)：9cm, 18cm

这个单元中还包括点胶与 UV 固化部分。

This unit also includes the dispensing and UV curing parts.

观察系统的摄像机为 POE 网口摄像机，不需要单独的电源。只要把摄像机连接到交换机上即可。

在安装镜头时，注意上端镜头的目镜为 0.5 倍，后端镜头的目镜为 1 倍，而且后镜头会有一个 0.5 倍的物镜，主要是为了延长工作距离。不要搞颠倒了。

The camera in the observation system is a POE network camera, so it doesn't require a separate power source. Just connect the camera to the switch. When installing the lenses, pay attention to the fact that the eyepiece of the upper lens is 0.5x magnification, while the eyepiece of the rear lens is 1x magnification. Additionally, the rear lens may have a 0.5x objective lens to extend the working distance. Make sure not to mix them up.

1.7 UV 点胶与固化单元 UV Adhesive Dispensing and Curing Unit

- UV 光固化 Curing
- 点胶为自动，沿光轴及前后使用电动微调架移动。

  The dispensing process is automatic, with movement along the optical axis and in the front-back direction achieved using motorized fine-tuning frames.

吐胶方式 Dispensing method	自由设定出胶方式，有吐出时间显示。 Freely set the dispensing method, with display of dispensing time.
自动定时吐胶 Automatic timed dispensing	0.01 ~ 99.99s
人工定时吐出 Manually timed dispensing	可持续吐胶 Continuous dispensing
最小出胶量 Minimum dispensing amount	0.0001ml
吐出间隔时间 Dispensing interval time	0.1 ~9.9s
输入电压 Input Voltage	220V
内部电压 Internal voltage	12VDC
输入气压 Input pressure	10~ 100psi
输出气压 Output pressure	1 ~ 80psi

点胶机的操控，参看点胶机说明书。

The operation of the dispensing machine is detailed in the dispensing machine manual.

UV 固化光源的操作，参看其使用说明。

The operation of the UV curing light source should be referenced in its user manual.

UV 固化光源的数据接口为 RS232，直接用 USB 转串口线连接到电脑。

The data interface of the UV curing light source is RS232, and it can be connected directly to the computer using a USB to serial cable.

1.8 光源、光功率计 Light source, optical power meter

系统为自带光源的三通道功率计，光源波长为 1310 和 650. 功率计能够满足对准的需要，灵敏度高、反应速度快。

The system is equipped with a three-channel power meter with built-in light sources at wavelengths of 1310 and 650 nanometers. The power meter meets the alignment requirements, with high sensitivity and fast response speed.

波长范围 Wavelength range	750～1750nm
光敏面 Photosensitive area	2mm
采样速率 Sampling rate	300/s
测量范围 Measurement range	-70dBm～5dBm
分辨率 Resolution	0.001dB
通道 Chanel	3 通道
通讯接口 Communication interface	RS232
电源 Power	220V
功率计探头光适配器 Power meter probe optical adapter	FC ， HP adapter，磁吸式夹具 Magnetic suction holder
光源输出适配器 Light source output adapter	APC
光源波长 Light source wavelength	1310，650(亮度可调节)

在安装接线时，只要按照功率计上的标识接线即可。数据接口为 RS232，直接用 USB 转串口线连接到电脑。

When installing the wiring, simply connect according to the markings on the power meter. The data interface is RS232, and it can be connected directly to the computer using a USB to serial cable.

1.10 运动控制单元 Motion control unit

本系统一共有 15 个电动轴需要控制，因此其运动控制器是又 2 个 8 轴控制器组成的。控制器的电源为 220V。

控制器的接口为 8 个电机线的接口，一个网口用于链接电脑，还有一个 IO 口，用于控制点胶机。

注意，本系统一共需要 2 个控制器，其中带有 IO 接口的为第一顺序控制器。

在安装接线时，只要按照标识接线即可。

The system has a total of 15 electric axes to control, thus its motion controller consists of two 8-axis controllers.

The controller interface consists of 8 motor wire interfaces, one Ethernet port for connecting to the computer, and one IO port for controlling the dispensing machine.

Note that the system requires a total of 2 controllers, with the one featuring an IO interface being the primary controller.

When installing the wiring, simply connect according to the markings.

1.10 传感器控制单元 Sensor control unit

本系统一共有 2 个接触传感器，用一个控制器控制。输入端的传感器为 1 号传感器，输出端的传感器为 2 号传感器。这两个不要接反，否则会引起软件的误判而导致系统故障。

传感器的电源为 12VDC。数据接口为 RS232，直接用 USB 转串口线连接到电脑。

The system has a total of 2 contact sensors, controlled by one controller. The sensor at the input end is labeled as sensor 1, and the one at the output end is labeled as sensor 2. Ensure that these two are not connected in reverse, as it could cause software misjudgment and system malfunctions.

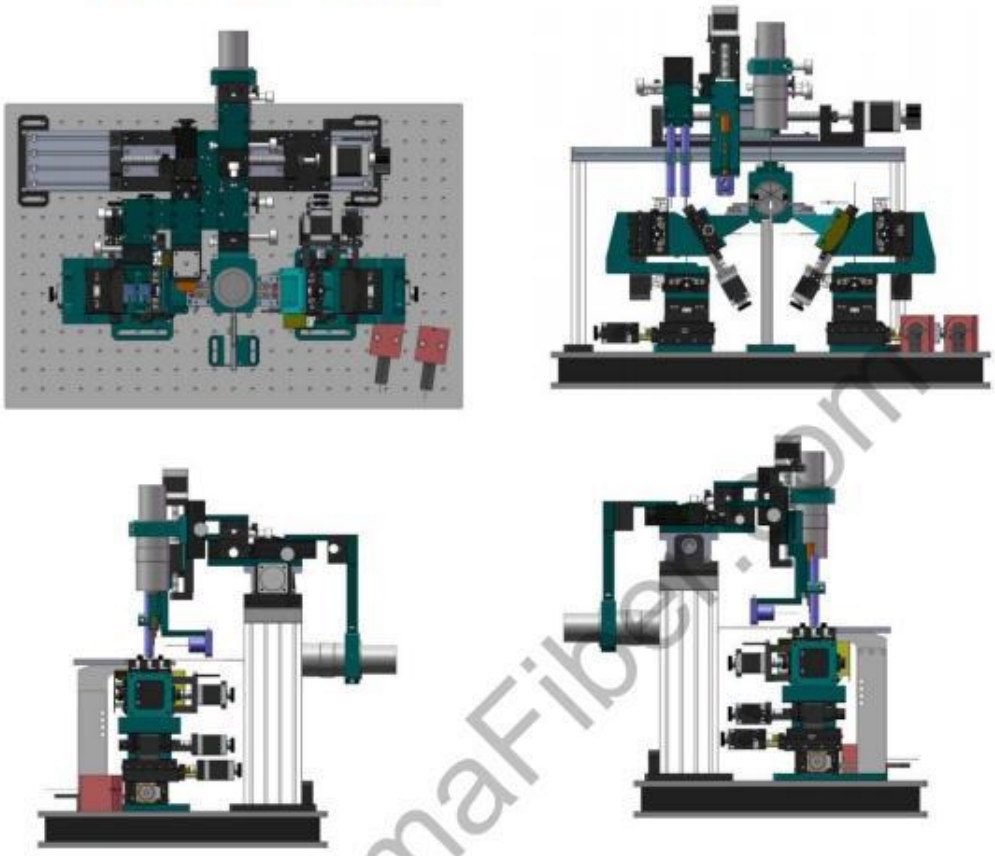
The sensor is powered by 12VDC. The data interface is RS232, and it can be connected directly to the computer using a USB to serial cable.

1.11 交换机 Switch

本系统的运动控制器和摄像头都是网络接口的，因此配备了一个 4 口 POE 交换机。交换机一共有 5 个接口，4 个用于连接设备，一个 UPLINK 口用于连接电脑。在接线时注意不要插错口。

The system's motion controller and cameras both have network interfaces, so a 4-port PoE switch is provided. The switch has a total of 5 ports, with 4 ports used to connect devices and one UPLINK port used to connect to the computer. When wiring, be careful not to plug into the wrong port.

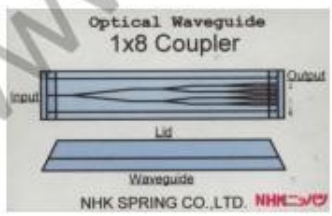
1.12 系统外形图 System exterior diagram



2. 系统的验收标准 Acceptance criteria for the system

在系统验收时，我们使用的是1×8 Coupler。用该器件在我们的系统上对准后能够满足其公开的技术指标 ≤ 10.3dB。

During system acceptance, we use an 1x8 Coupler. When this device is aligned on our system, it meets its published technical specifications of 10.3dB.



	1×4	1×8	1×16	1×32
Insert Loss	≤ 7.0dB	≤ 10.0dB	≤ 13.0dB	≤ 17.0dB
Uniformity	≤ 0.6dB	≤ 0.8dB	≤ 1.2dB	≤ 2.2dB
PDL	≤ 0.1dB	≤ 0.1dB	≤ 0.3dB	≤ 0.3dB
Operating Wavelength	1260 ~ 1360 / 1480 ~ 1580 nm			
Operating Temperture	– 40 ~ 85 ℃			

3. 系统的安装与设置 Installation and Setup of the System

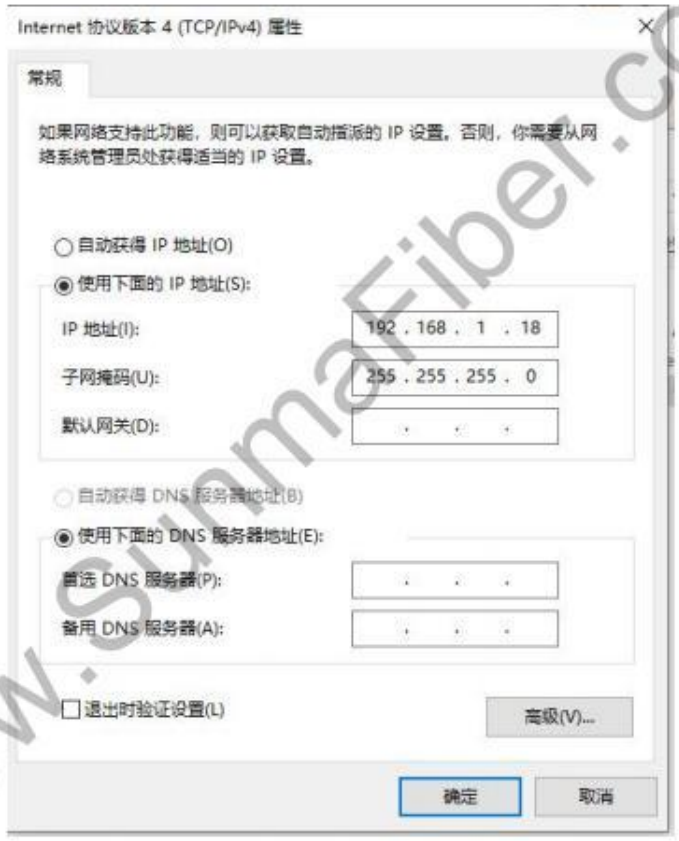
本系统的软件为64位软件需要运行在windows10或windows11环境下。

The software of this system is a 64-bit application and needs to run in a Windows 10 or Windows 11 environment.

3.1 网络配置 Network configuration

本系统的运动控制器和摄像头都是网络接口的，因此配备了一个4口POE交换机。因此windows的网络设置需要更改为固定IP。

Since the motion controller and cameras of this system are both network interfaces, a 4-port PoE switch is provided. Therefore, the network settings in Windows need to be changed to a fixed IP address.



3.2 驱动 Driver

本系统中会用到USB转串口线，需要安装其驱动程序。另外需要安装微软的运行库。

In this system, a USB to serial cable will be used, requiring the installation of its driver software. Additionally, Microsoft's runtime library needs to be installed.

For more Software Operations will be available during Training.