

# Automatic Spinneret Inspection System

## Model: A-600F



Advantage Scientific, Inc.

# I. The importance of cleaning of spinneret holes

## Automatic Spinneret

The following problems are related to dirty spinneret holes:

1. Reduces spinning quality
2. Reduces the efficiency of spinneret cleaning equipment
3. Spinning processing problem
4. Quality controlled for new spinnerets

Because spinneret hole cleaning is the key factor in spinning quality and efficiency, it is critically important to detect the cleanliness of spinneret holes. A microscope and projection method was previously used for spinneret detection. This detection method could only inspect a few holes or small number of spinnerets. The quality requirement for man-made fiber is now high with many varieties of filament and the daily output must constantly be improved to reduce labor costs. The previous manual hole-by-hole detection method is no longer satisfactory, resulting in spinning product quality degradation, leading to defect management and performance losses.

In view of this, the company has adopted the most advanced optical image processing techniques, applied sophisticated semiconductor optical equipment in combination with Japanese ultra-high precision screws, servo motors and imported high-resolution optical components with English versions of the operating software to develop an 「Automatic Spinneret Detection, Cleaning and Imprint System」 to assist enterprises in solving the previously mentioned spinning processing problems.

# Inspection System

「Automatic Spinneret Detection, Cleaning and Imprint System」 developed by our company can rapidly bring the following benefits for your plant:

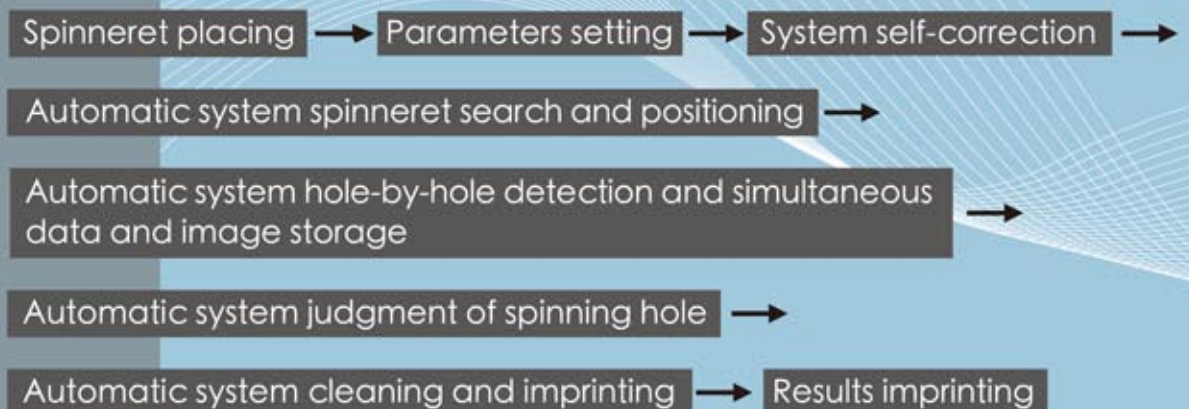
- 1. Improve product quality and avoid secondary product problems:** Because the system detects the holes one by one and makes a record for each one, there is no omission, with all spinneret hole detection results correct. This process ensures good quality rayon and avoids the deadweight loss arising from secondary product problems.
- 2. Save labor cost:** This system automatically detects and cleans several to several dozen spinnerets at one time using high-pressure air to eliminate all foreign matter. If the high-pressure air fails clear the hole, the hole is indicated by laser light and cleaned again by a manual operator, or automatically imprinted on the spinneret for follow-up treatment. This control and disposal process is both timely and effective.
- 3. Used as factory-entry quality detection for new spinneret:** This system automatically detects and cleans several to several dozen spinnerets at one time using high-pressure air to eliminate all foreign matter. If the high-pressure air fails clear the hole, the hole is indicated by laser light and cleaned again by a manual operator, or automatically imprinted on the spinneret for follow-up treatment. This control and disposal process is both timely and effective.
- 4. Determine the usage years and quality of old spinnerets:** Because every spinneret has its own detection history record, it is easy to determine the on-line time of spinnerets to assess the spinneret service life.
- 5. Assess the yield rate of cleaning equipment:** We can know the cleaning situation of each spinneret through this system to improve the front-end cleaning equipment process and improve spinneret cleanliness.
- 6. Instantly assess and improve abnormal spinning process phenomena:** if dirty spinneret holes are found concentrated in a certain area through this system, it may be caused by a processing temperature problem or other spinning process problem, allowing action to be taken to improve the spinning process.
- 7. Recover equipment costs within a short time:** This system is fully automatic, detecting each hole accurately, with no cost increases or labor strikes, working 24 hours a day, 365 days a year, relieving the pressure of labor cost increases.

## II. System Process

# Automatic Spinneret

The system operating process is described as follows:

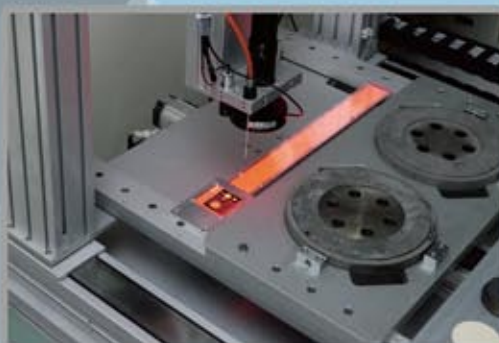
Operation Process Chart:



■ Spinneret placing



■ Parameters setting



■ System self-correction

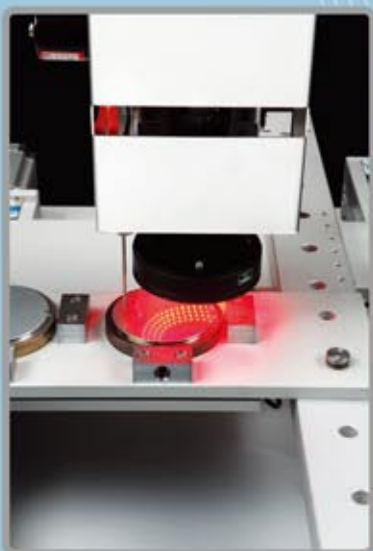


■ Automatic system spinneret search and positioning

# Inspection System



- Automatic system hole-by-hole detection and simultaneous data and image storage



- Automatic system cleaning and imprinting




- Automatic system judgment of spinning hole



- Results imprinting

### III. System Parameters:

# Automatic Spinneret

Function/Structure	Specifications
1. Fully automatic X-Y-Z-axis control platform (standard detection table: 600 x 600 mm) (※The table size can be designed in accordance with customer's requirements)	1. X-axis travel: 600mm 2. Y-axis travel: 600mm 3. Z-axis travel: 150mm 4. Repeated positioning accuracy: +0.01 mm 5. 400W AC servo motor (10000 parse) The XYZ platform location can be software jog adjusted for specific position detection
2. Diameter size range of detected holes	0.02 ~5 mm. determined according to magnification ratio and CCD camera sensor
3. The shape of detected hole	
4. CCD Camera	Imported optical components, standard 800,000 pixels high-resolution CCD (can be equipped with another CCD with higher resolution according to the hole size)
5. Upper and lower light source detection (Back, Front light)	High-brightness LED ring upper light source High-brightness LED row-like lower light source specific for semiconductor (No need for cooling fans)
6. Detection items	1. Maximum and minimum diameter 2. Area 3. Perimeter 4. Roundness 5. Wear



# Inspection System

7.Detection speed	0.2~0.7 seconds for each hole (to be determined according to arrangement of holes; e.g.: about 13.5 minutes for detecting 2616 holes of spun fiber spinneret with a diameter of 240mm)
8.Focus mode	Adopt multi-point autofocus with correction function for declined spinneret.
9.Detecting the number of spinnerets	With large-size detection platform of 600 x 500 mm, several to dozens of spinnerets can be fixed and detected simultaneously according to the spinneret outside diameter.
10.Detection method	Automatic computer detection one by one, recording the sizes and images of each spinneret and hole; the unqualified holes can be recorded automatically with no manual supervision.
11.Automatic cleaning function	Unqualified holes are detected and cleaned automatically using air purge (6 bar).
12.Automatic imprinting function (optional)	Holes that cannot be cleaned by air purge are automatically imprinted for a repeat cleaning by the operator.
13.Automatic laser indication	Holes that cannot be cleaned by air purge are indicated by laser light for a repeat cleaning by the operator.
14.Automatic correction function	The system instrument self-corrects before detection in order to realize the most accurate measurement.
15.Detection results	1.A color map of the spinnerets is provided making it easy to find problem spinning nozzles 2.Arrange the positions of each holes of spinneret 3.Clean, imprint (optional) and indicate the unqualified spinnerets
16.Operating software	Simple to use English operating software
17.Computer system	Listed companies in the latest industrial computer.

★ The manufactures reserve the right to modify technical specifications without notice.

# Equipment structure

## Automatic Spinneret

- Appearance of platform equipment





# Inspection System

※ Iron steel rigid structure with box for jigs



※ Servo motor with high-precision  
(not the general stepping motor)



## Automatic Spinneret

- ※ LED ring upper light source with high-brightness



- ※ Imported optical lens with high-resolution



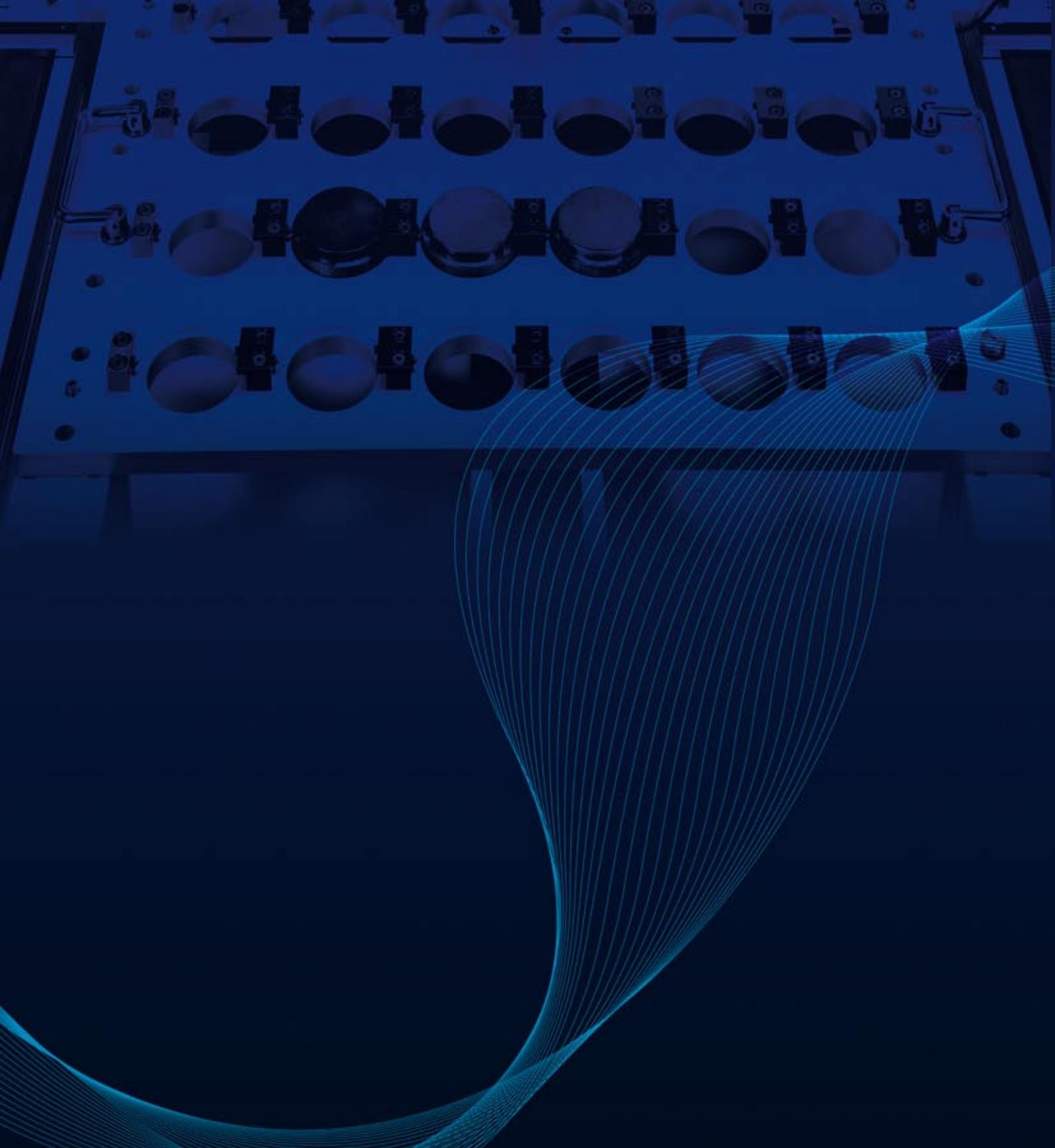
# Inspection System

- ※ LED row-like lower light source with high brightness specially used for semiconductor (no need of fans to cool)



- ※ Processing device with high-precision (the spinnerets in various sizes can be used flexibly as required)





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