

Admin's Guide for the Insect Digitisation Line

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Safety first!

The Insect Digitisation Line includes conveyors driven by powerful electrical motors. Any particles that might land in their gears will be sucked in. Therefore, anybody coming closer than 2 meters to the line must not wear any strong wraps. This includes ties, scarfs, key hangers, meeting name tags, etc. There are warning signs posted on the wall about this.

The line operators must visually inspect all visitors, point them to the warning signs, explaining the potential dangers, and see that these instructions will be obeyed to. If not so, the line operator must stop the system immediately, until the normal order is restored.

Any visitors coming closer than 2 meters of the line must be advised of the available emergency buttons, and be told not to hesitate hitting them if there is any sign of trouble.

Equipment of the digitisation line

1. Conveyor Belt Systems
 - a. Five **Belt Conveyors**
 - b. Four **Sensors**
 - c. **Control Centre**, including power supply and motor drivers (large box)
 - d. **Connection Box** (small box)
2. Imaging System
 - a. Instrument **Stand**, holding the camera(s) and light(s)
 - b. Four LED **Light** units
3. Computers
 - a. **Imaging Computer** from Lenovo (Linux Ubuntu 17.10.1) with Gigabit network card
 - b. **Control Computer** from Lenovo (Windows 10) with two Gigabit network cards and one wireless network card
4. Network
 - a. Gigabit **Ethernet Switch** from Jensen (private network of the digitisation equipment)
5. Servers
 - a. Remote **Server** for post-processing and data storage
 - b. Remote **Server** for web and database service if IWBF ID and metadata system used

Refer to the Delivery Note for information of the manufacturer, model, and purchase / support address.

Conveyor Belt System

They are already pre-installed and configured. Usually it will not be necessary to do any changes in them.

However, proper belt tensioning is critical. If not so, the belt will veer off the driving axles, hit the sides, wear out, and eventually break down. Belt tensioning may change due temperature, humidity, wear, etc. It is part of normal maintenance to keep an eye on the proper alignment of the belts. The belts should always be in the middle of the conveyor section, and if not so, adjustments are needed.

Belt tensioning can be adjusted with the screws on each side of the conveyors. There is a special manual provided by the conveyor vendor Easy Conveyors Ltd, on how to install the belts and how to maintain a proper positioning of the belts. Refer to that.

Imaging station

Normally there are is no need to make any changes to the imaging station.

Computer Settings

Imaging Computer

It runs Linux OS with Ubuntu 17.10.1 Server distribution. The imaging application is located at

```
/root/insect_apps/
```

It will be run automatically after booting with the script

```
/root/insect_apps/start.sh
```

The application uses TCP 50080 port to communicate with the Control Computer.

Control Computer

It runs Windows 10 OS. Java JRE and LabVIEW Run-Time Engine from National Instruments are required for the digitisation line. There are two applications running for the operation of the line.

1. *DigiConveyor*: The central software to control the whole imaging line, located at

```
C:\Program Files\DIGI_SOFT\DIGI_Insect\
```

The configuration file of the software is *DigiConveyor.properties* under the root of the application directory. The most relevant settings are as follows:

- *collection_password*: The password used to add the new collection

- *server_data_root*: The remote server data storage directory
 - *server_hostname*: The remote server host name for connection
 - *server_username*: The remote server user name for connection
 - *py_camera_insect_1*: The serial number of the camera for the first shot
 - *py_camera_insect_10*: The serial number of the camera for the last shot
- Note: Multiple cameras are supported by the system. They can be configured by adding their serial numbers with this parameter. For example, *py_camera_insect_2=Nikon/XXXXXXXX*. If you put the same serial number for the two different parameters, the same camera will take two shots.
- *data_dir*: Control Computer local data directory
 - *archive_dir*: Control Computer local data directory
 - *log_dir*: Control Computer local data directory
 - *xml_id_prefix*: ID prefix in XML metadata file
 - *xml_creator*: Data creator in XML metadata file
 - *xml_contributor*: Data contributor in XML metadata file
 - *xml_rights*: Copyright in XML metadata file
 - *xml_rightsholder*: Copyright holder in XML metadata file

2. *ConveyorControlApplication*: The software to control the automation system, located at

C:\Program Files\DIGI_SOFT\ConveyorControlApplication\

It is pre-configured. Usually it is not necessary to change anything here.

When adding new collections, you need to edit the configuration file *DigiConveyor.properties* where you also can set/change the data path. There also is place for the *collection_password=XX*, which should be changed.

Performance tuning

The control computer is a real-time system. The processes should have priority “high” or “real-time” in the Windows operating system.

In order to maintain real-time processing capacity, the control computer must not be used to run any other applications than those mentioned here. This way the CPU load should never exceed 50%. If, for any reason, the CPU reaches 100%, this may lead delays in sensor signal processing and have surprising effects.

Seriously, if the control computer is busy 100% when a pallet arrives at the end of the line, the signal of the sensor may not be processed on time. This would lead to a situation where the specimen falls off the line, destroying it. Therefore, a safety device such as a belt, across or after the very end of the line must always be in place.

Network Settings

There are two networks in the system

- The private network for system control and internal data transmission.
- The public network for remote server connection.

For private network, the Imaging Computer, Control Computer, and Control Centre, are connected via Ethernet Switch. The IP address setting is as follows,

- 169.254.0.0/16
- Imaging Computer: static 169.254.3.101
- Control Computer: Automatic
- Control Centre: Automatic

For public network, it is necessary to have the access to the Servers.

Server Settings

Remote server for data storage and processing

1. Data Storage

The Control Computer must have access to the server. A dedicated user is recommended to be created for the access of DigiConveyor application to upload the data. The following key has to be added as the authorized_keys of that user.

*/*Deleted from this public document.*/*

Also the backup system of the storage is necessary to set up to do the periodical backup. A typical daily data upload amount is 20-50GB depending on the camera setting and daily production.

2. Data Processing

A Java application is used to process incoming images and do post processing. It requires Java JRE and MySQL database.

For MySQL database, a table named "processing" is required. Following SQL commands can be used for it.

```
CREATE TABLE IF NOT EXISTS `processing` ( `id` int(11) NOT NULL,
`source` varchar(500) NOT NULL, `value` varchar(500) DEFAULT NULL, `used`
int(11) NOT NULL DEFAULT '0' ) DEFAULT CHARSET=latin1;
```

```
ALTER TABLE `processing` ADD PRIMARY KEY (`id`);
```

```
ALTER TABLE `processing` MODIFY `id` int(11) NOT NULL
AUTO_INCREMENT;
```

The application supports multi-threads to increase the processing speed, but it will consume more CPU and memory resources. There is a configuration file associated with the software to change the settings.

Remote server for IWBF ID and metadata system

This is optional.

IWBF will be run on the server. It requires a java EE application server, such as Glassfish, and MySQL database. If the function of individual ID label printing is required, a dedicated user is recommended to be created for the access from the label-printing computer.