SimpleCoat Operation Manual

Version 1.2
April 4, 2018
CE Compliant
Part No. 23100600

for models:
SimpleCoat - PN 23100005-0001
SimpleCoat TR - PN 23100005-0002

for use with:
SimpleCoat Software, Version 1.0.17

611 Hollingsworth Street
Grand Junction, Colorado, USA 81505
tel:+1.970.245-0408 - fax: +970.245.9674
request@gpd-global.com - www.gpd-global.com

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Prepared by GPD Global Documentation Dept.
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**SimpleCoat - Warnings, Cautions and Notes**

Before operating the system, identify the warning placards that are positioned on the machine and read the corresponding notices indicated below. It is important to note that not all the placards below may be attached.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>![Eye Protection Icon]</td>
<td>Always wear approved safety eye protection when operating or working near the system.</td>
</tr>
<tr>
<td>![Warning Icon]</td>
<td>In situations where inattention could cause either serious personal injury or damage to equipment a warning notice is used.</td>
</tr>
<tr>
<td>![No Smoking Icon]</td>
<td>Do not smoke near the system. Always have a fire extinguisher available for emergency use.</td>
</tr>
<tr>
<td>![Manuals Icon]</td>
<td>Before operating the system, read and understand the manuals provided with the unit.</td>
</tr>
<tr>
<td>![Power Disconnect Icon]</td>
<td>Before performing any repairs or maintenance to the system, turn off power and lock out the power disconnect switch.</td>
</tr>
<tr>
<td>![Hands Icon]</td>
<td>Never place hands or tools in areas designated by this symbol when the machine is in operation. A dangerous condition may exist.</td>
</tr>
<tr>
<td>![Warning Icon]</td>
<td>Warning notices are used to emphasize that hazardous voltages, current, temperatures, or other conditions that could cause personal injury that exist with this equipment or may be associated with its use. Only qualified personnel should enter areas designated with this symbol.</td>
</tr>
<tr>
<td>![Pinch Hazard Icon]</td>
<td>A pinch hazard from moving parts is possible. Avoid contact.</td>
</tr>
</tbody>
</table>
Warranty

**General Warranty.** Subject to the remedy limitation and procedures set forth in the section “Warranty Procedures and Remedy Limitations,” GPD Global warrants that the system will conform to the written description and specifications furnished to the Buyer in GPD Global’s proposal and specified in the Buyer’s purchase order, and that it will be free for defects in materials and workmanship for a period of one (1) year. GPD Global will repair or, at its option, replace any part which proves defective in the sole judgment of GPD Global within one (1) year of date of shipment/invoice. Separate manufacturers’ warranties may apply to components or subassemblies purchased from others and incorporated into the system. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF A MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

**Limitations.** GPD Global reserves the right to refuse warranty replacement where, in the sole opinion of GPD Global, the defect is due to the use of incompatible materials or other damages from the result of improper use or neglect. This warranty does not apply if the GPD Global product has been damaged by accident, abuse, or has been modified without the written permission of GPD Global.

Items considered replaceable or rendered unusable under normal wear and tear are not covered under the terms of the warranty. Such items include fuses, lights, filters, belts, etc.

**Warranty Procedures and Remedy Limitations.** The sole and exclusive remedy of the Buyer in the event that the system or any components of the system do not conform to the express warranties stated in the Section “Warranties” shall be the replacement of the component or part. If on-site labor of the GPD Global personnel is required to replace the non-warranted defective component, GPD Global reserves the right to invoice the Buyer for the component cost, personnel compensation, travel expenses and all subsistence costs. GPD Global’s liability for a software error will be limited to the cost of correcting the software and the replacement of any system components damaged as a result of the software error. In no event and under no circumstances shall GPD Global be liable for any incident or consequential damages; its liability is limited to the cost of the defective part or parts, regardless of the legal theory of any such claim. As to any part claimed to be defective within one (1) year of the date of shipment/invoice, the Buyer will order a replacement part which will be invoiced in ordinary fashion. If the replaced part is returned to GPD Global by the Buyer and found by GPD Global in its sole judgment to be defective, GPD Global will issue to the Buyer a credit in the amount of the price
of the replacement part. GPD Global’s acceptance of any parts so shipped to it shall not be deemed an admission that such parts are defective.

Specifications, descriptions, and all information contained in the manual are subject to change and/or correction without notice.

Although reasonable care has been exercised in the preparation of this manual to make it complete and accurate, this manual does not purport to cover all conceivable problems or applications pertaining to this machine.

Legal

Trademarks

GPD Global® is a registered trademark of GPD Global, Incorporated.

Throughout this manual trademarks are used. Rather than put a trademark symbol in every occurrence of a trademarked name we state that we are using the names in an editorial fashion only. This is to the benefit of the trademark owner with no intention of infringement on the trademark.

Disclaimers

GPD Global® dispense systems are intended for the stated functions at the time of sale. GPD Global® is not liable for other uses.

<table>
<thead>
<tr>
<th>IMPORTANT: Operation of a damaged machine may cause personal injury an invalidate the warranty.</th>
</tr>
</thead>
</table>

| IMPORTANT: | WICHTIG: Die Bedienung einer beschädigten Maschine kann zu Verletzung des Bedieners sowie zur Ungültigkeit der Garantie führen. | IMPORTANTANTE: Il funzionamento di un'apparecchiatura danneggiata può causare lesioni personali e invalidare la garanzia. | IMPORTANTANTE: La utilización de una máquina averiada puede provocar lesiones e invalidar la garantía. |
1.0 System Manual

This manual is designed primarily as a reference document for production and operation.

1.1 Notice

This document, including the information contained herein, is the property of GPD Global, Inc. and is considered confidential and proprietary information. It is supplied on the condition that it is not to be used, disclosed, or reproduced in whole or in part, for any reason without prior written consent of GPD Global, Inc.

1.2 Power Requirements

Electrical Rating: 220 V 50 Hz, 6 Amps

1.3 Pressure Settings

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<th>Description</th>
<th>Setting</th>
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<td>RG1</td>
<td>Main air pressure</td>
<td>6 Bar</td>
</tr>
<tr>
<td>Regulator 2</td>
<td>Material Air Pressure -1</td>
<td>0 to 4 Bar</td>
</tr>
<tr>
<td>Regulator 3</td>
<td>Air Atomizer</td>
<td>0 to 4 Bar</td>
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</table>
## 1.4 Valve Labeling

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<th>Valve</th>
<th>Type</th>
<th>Description</th>
<th>Z-Slide</th>
<th>Rotary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SV-500</td>
<td>Spray Valve</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>DV-500</td>
<td>Dispense Valve</td>
<td>Yes</td>
<td>No</td>
</tr>
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</table>
2.0 Introduction

2.1 System Description

The SimpleCoat system is designed for conformal coating spray and dispensing application. The spray and dispense valves are mounted on a 3 axis Cartesian platform and all spraying/dispensing takes place within the enclosed work area. Safety limits prevent axis overrun. A flexible software program allows full control of the spray/dispense head movement.

The User Interface allows the operator full control of the system. This includes:

- Machine Setup
- Manual Operation
- Program Selection

Machine status and error messages are displayed on the computer screen and via the light tower. It is critical that operator(s) have read or by training understand the operation of the machine.

If the system is operated outside of the uses outlined above a dangerous condition can be present and the safety features installed in the system may be insufficient.

2.1.1 Safety Precautions

The SimpleCoat operation involves electrical power, compressed air and mechanical devices and the use of hazardous materials. It is very important that personnel operating and servicing the system are qualified and fully understand the safety and system precautions.

2.2 Intended Use

Use of the system in any manner other than described in the documents supplied with the equipment may result in injury or damage to the system. Examples include removing door interlocks or bypassing safety devices, modifications to original design or using incompatible tools. When using the system all precautions and operation should be in accordance with local regulations.
2.3 Emergency Shutdowns

The EMERGENCY STOP button can be pushed if someone is in danger due to circumstances such as electric shock, unexpected valve movement, or possible damage to the PCB.

2.4 Emergency Stop Recovery

Open the front door, remove the PCB, close the door and rotate the stop button.

2.5 Environment

2.5.1 Noise Levels
Below 65 dbA

2.5.2 Materials and Chemicals
There are no hazardous materials or chemicals used in the system except for the application conformal coating.

2.5.3 Unauthorized Use
The System is a self contained design avoiding contact with any accessible area. However, under certain circumstances, it is possible to enter the system while the XYZ platform is powered up. Only authorized personnel may do this.

2.6 Prepare for Start Up

Open the front door, remove the PCB, close the door and rotate the stop button. The System will go to the Home Position.

2.7 Storage

Storage should meet requirements specified in Section 3.7, Operating Environment.
- **Dust and Particulates**: The system should be closed tightly including all connectors and inlets. A dust cover is recommended if the machine is located in a dusty environment.

- **Dispensing and Spraying Valves and Associated Piping**: If the system is to be stored for long periods then the valves and pipe work should be flushed with a compatible solvent. This includes valves, pipe work to valves and pressure containers.
3.0 Installation and Setup

3.1 Tools and Material Needed

- 15 mm spanner wrench
- Forklift
- Work gloves
- Allen keys sizes 3 mm, 4 mm, and 5 mm
- Safety glasses

3.2 Unpacking and Inspection

1) Remove the crate using the spanner wrench by unscrewing the bolts.
2) Unpack the system from the strapping and packaging.
3) Remove the bolt anchors.
4) Use the forklift to carefully remove the system from the pallet. Ensure the forks are inserted all the way from the front or back and are long enough to go completely through the pallet.
5) Maneuver the system to the final operating position.
6) Lower the system to the ground ensuring the feet are at the correct approximate height and all four feet touch down at the same time. Adjust any feet as necessary.

WARNING: The following procedures should be performed by qualified personnel in accordance with the user manual as well as applicable local safety regulations.
3.3 Inspection

1) Open the front doors and remove all packaging and strapping materials.
2) Check the total system for any damage or loose components.
3) Install the light tower.

3.4 Leveling the System

Tools needed:
- Spirit level
- 19 mm spanner wrench

To level the system:
1) Put the spirit level on the front rail.
2) Observe the position of the bubble and adjust the feet until levelled.
3) Put the spirit level on the back rail and adjust the back feet until levelled.
4) Put the spirit level across the rail at the left side and adjust the feet until levelled.
5) After checking all the corners close the locknuts on the feet.

3.5 Power Up

| WARNING: Make sure that the Main Power Switch is off before connecting the system to the power source. Failure to comply with electrical specifications can result in damage to the machine as well as personal injury. The electrical connection must be made by a qualified electrician and must comply with any applicable local standards. |

1) Plug the system into the appropriate power plug. Ensure the system has proper grounding.
2) Ensure the quality of the power is sufficient to ensure smooth operation.
3.0 INSTALLATION AND SETUP
3.6 OPERATING ENVIRONMENT

3) Locate the main air regulator, attach the quick disconnect air hose of 8 mm diameter to the side of the machine and open the air slowly.

4) Adjust the regulators to the correct pressures as specified.

5) Check the valves and the brackets to ensure that they are secure.

6) Close all the covers.

7) Ground any pressure containers.

8) Turn on the power at the front panel.

9) Move the valves heads around the system case to ensure no obstacles are found. If this is the case contact the GPD-Global, Inc. service personnel.

10) Check that the exhaust pipe is operational.

3.6 Operating Environment

<table>
<thead>
<tr>
<th>Location:</th>
<th>The System must be placed in an area that is level, away from standing water, overhead leaks or spray areas.</th>
</tr>
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<tr>
<td>Temperature and Humidity:</td>
<td>The system should be operated between 4°C - 41°C and low humidity with no condensation forming on the system.</td>
</tr>
<tr>
<td>Software:</td>
<td>The system consists of two programs, the SimpleCoat software for application of conformal coating and the Coating Project file for storage of PCB information.</td>
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4.0 Operating Safety

4.1 Listed Notices and Warnings

- Safety goggles, gloves and long sleeve clothing should be required safety wear when working with automated industrial systems.
- Read and understand all of the documentation before using the system.
- Do not disable the safety features of the system.
- Do not remove any pneumatic attachment without first relieving the air pressure.
- Use only recommended parts for replacement.
- Remain clear of all moving parts while in operation.

4.2 Safety Devices and Guarding

The system has several safety features built in to protect the operator from dangers during normal working operation.

**WARNING:** The safety features on the SimpleCoat must never be tampered with, bypassed, or disabled. GPD-Global, Inc. is not responsible for any dangerous conditions encountered, mechanical or human, because of alteration or disabling of any safety feature.

4.2.1 Safety Circuit

The main power to the machine is monitored and controlled by a redundant safety circuit. Redundancy consists of two parallel electrical circuits working on tandem. The safety device monitors the state of the emergency stop button and other safety mechanisms, for example, an open door status. The power to the motor, as well as pneumatic supply, are cut automatically. When the safety device is actuated, all machine power and pneumatic motion is terminated.

4.2.2 Doors

The doors are monitored by limit switches. When the doors are open, the power to the pneumatics and motor are disconnected.
5.0 Operation

5.1 Start Up Procedure

1) Check fluid air pressure.
2) Close doors.
3) Release Emergency stop button.
4) Turn on Main power using red rotary switch on machine front.
5) Check and turn on air supply.
6) Check exhaust air flow.

5.2 Light Tower Operation

A two-stack indicator light is installed on the machine. There is a green light at the top of the stack and another is red light which is on the bottom. When the green light is fully illuminated the machine is functioning properly. When the green light is flashing the machine is on standby and temporarily disabled.

When the red light is illuminated continuously the machine has either been stopped by the operator or there is some problem in the machine and the machine has been disabled. In a red light condition, the machine cannot be restarted until it is either restarted by the operator or the disabling condition has been rectified.

5.3 Facility Requirements

- **Air Supply**: 6 bar, 85 PSI, dry clean air
- **Exhaust Port**: minimum 250 CFM, diameter 127 mm (5”)
- **Power**: 110/220 VAC, 50/60 Hz
5.4 Machine Safety Check

The machine safety check ensures that critical safety features such as the emergency stop and door interlocks are operating correctly. During start up the operator must enter machine safety check values and this must be completed successfully. Failure to do so will return a critical fault shutting the system down.

If repeated machine safety check failures occur qualified maintenance personnel should be consulted and the system examined and tested before the system is placed back in operation.

5.5 Homing the Axes

To ensure the x, y, z axes are properly positioned.

5.6 Standard Needle Calibration

The needle calibration sequence is to be completed by physically positioning the needle with respect to a calibration point. If the needle is not directly over the point, the operator must physically reposition the needle so it is above the calibration point.

5.7 Shutdown Procedure

1) If the machine is in operation, wait until it has finished the process and then returns to standby.
2) Press the Emergency Stop button.
3) Turn off power to the system.
4) Clean any excess material from the tips of the needles.
5) Clean the spray valve as specified.
6) Clean the purge and park cups
6.0 Programming SimpleCoat

6.1 Installing the Software

The SimpleCoat software is designed to be user friendly. The operator must be familiar with Windows and its most common features. It is highly recommended that operators are comfortable with these areas before attempting to program the system.

6.1.1 Hardware and Software Requirements

SimpleCoat requires a Pentium Processor and at least 32MB of available memory.

6.1.2 Communications

The system communicates with an onboard computer using a standard Ethernet connection. Set the IP address of the computer integrated with the machines as 192.168.1.10.

6.1.3 Download and Install Software

To download the SimpleCoat software onto your hard drive:

1) Be sure the computer you are using meets the specifications in Section 6.1.1 above.

2) Download the .zip file to a local directory from the URL noted in the Download Instructions document accompanying your machine. The required user ID and password are also included in this document.

3) Expand the .zip file.

4) Run the setup.exe file.

5) Plug the computer into the SimpleCoat machine using the cable already provided.

6.1.4 Uninstalling SimpleCoat

WARNING: The computer must be at the same ground potential as the system. Damage to the system or computer may result if the ground potentials are different.
6.2 Conformal Coating Materials

SimpleCoat is configured to utilize a variety of conformal coatings. The ability to coat PCBs well is through development of the necessary skills and experience. Flexibility in operation, within the boundaries of this manual, may lead to the optimized results with trial and error often leading to the best results.

6.2.1 Dispense and Spray Valves

The conformal coatings are applied using the two valves in tandem to achieve the best finish. The Dispense valve, sometimes known as the Needle valve, applies a thin straight line of coating for accurate close proximity application. The spray valve provides an atomized spray line which is less precise along the edge but covers a greater area.

6.2.2 Dispense Valve

Adjustment of the Dispense valve is carried out by turning the knurled knob on the top of the valve. This adjusts the flow rate of the conformal coating material. A constant flow of conformal coating is the desired result to achieve precise application. Selection of the appropriate needle allows the operator to vary the coating width on application.

The height of the dispense valve should be set through the software interface at approximately 1-2mm above the workpiece. This is close enough to form a continuous bead but not too close to conflict with a deformed PCB board.

WARNING: Needles do vary in length and calibration is required each time a new needle is selected. Failure to carry this out can lead to damage to the dispenser or the PCB.
6.2.3 Spray Valve

Adjustment of the Spray valve is carried out by two adjustments:

- Turning the knurled knob on the top of the valve which adjusts the valve stroke and flow rate.
- Adjustment of the atomizing pressure which controls the spray width pattern.

When first setting up the spray valve the method is as follows:

1) Turn the air pressure to zero.
2) Take off the spray valve cap.
3) Turn the knurled knob until the needle stroke is down all the way.
4) Using the Purge command on the software, open the valve and adjust the stroke through the knurled knob until a few drops of coating per second are observed. This may take repeated cycles to achieve the correct flow process.
5) Replace the spray cap.
6) Continue to use the Purge command, adjusting the atomizing pressure upwards until a satisfactory spray pattern is achieved on a test sample.

CAUTION: If the pressure is too high the conformal coating will mist and if it is too low there will be splatter. As a guide, thin solvent based conformal coatings require very low pressures < 1 PSI (pounds per square inch) whereas silicones can be as high as 15 PSI.

The height of the spray valve should be set via the software at approx 10-20 mm off the board. This gives a variation in spray width typically of 6-20mm off the board, depending on the viscosity of the material and the atomising air pressure of the system. Practice will develop the knowledge for correct setup of various materials over time.

Once the valves are correctly set up for the system, they should not need to be altered. Changing the valve speed will change the application of the coating material. This is more effective than adjustment of the valve itself.
6.3 Design Coating Diagram

The next stage of the process is to examine the PCB to be coated and decide how the coating is to be applied. Information needed is what must be coated, what must not be coated and what does not matter. This can be seen in Figure below.

The board has the following:

- Areas not to be coated.
- Areas to be coated.

The coating of the PCB can in fact be broken into different types of coating shape for the coating areas. The use of the two valves, spray and dispense and how they are applied provide a flexible process tool.

Using this concept there are three types of pattern that can be drawn:

- Spots - Circular points made by the dispense or spray valve when not moving.
- Lines - Single lines of coating made dispense or spray valves.
- Areas - Repeated lines of coating made dispense or spray valves that build up an area of coating.
- Circle – Circles made by dispense or spray valves.
- Arc – Arc made by dispense or spray valves.

The sample illustrates how different types of pattern may build up a complete coating diagram. This can be seen in Figure below.

6.3.1 Building and Coating Diagram
Image 1. Different conformal patterns are illustrated below. Line pattern (1), area (2), dot (3), and circle (4).

The coating diagram now consists of a line, area, dot and circle.

6.4 The SimpleCoat Software

The coating of the PCB can in fact be broken into different types of coating shapes for the coating areas. The use of the two valves, spray and dispense, and how they are applied provide flexibility to the process tool.

Image 2. SimpleCoat main menu screen.
Following is the procedure to show how to use the SimpleCoat software. You can create a new program in three different ways:

- Enter the values directly.
- Enter the values from the JPEG image of the PCB.
- Enter the Value from the Teach mode.

6.4.1 Enter the Values Directly

The first stage of the process is to create a new program file. Starting the Simple-Coat software provides the main page menu.

1) To create a new program file, click the ‘file’ menu and click the ‘new’ option. Enter Height and Width of the PCB in mm.

   **Image 3. Click “File” on the menu bar and then click “New” on the drop down menu.**
2) Enter the size of the PCB board (circled in Image 4 below), then add the type (T) of conformal pattern (line, area, dot or circle) and the x, y, z location where the coating is to be dispensed.

Image 4.

3) Lastly, enter the speed (S, above) of the valve to be used in the process.

6.4.2 Enter the Values from a JPEG Image of the PCB

To create a new program from the JPEG image, select the "File" option from main menu and select "Import" option. Select the JPEG image that you want to import.

Image 5. Go back to the “File” menu and select “Import”.
Enter height and width of the PCB and maximum Z. Then Press "SET ZERO" button. Select the right bottom and left upper corner of the image. If you want, you can zoom up the image by Zoom + button.

First select the Head and Nozzle then select different shapes like Dot, Line or Area. Select the portion of the PCB, you want to coat, with the help of the mouse. The co-ordinates of the shape are written in file.

Repeat this process to complete the coating process of the board. Save the program.

6.4.3 Enter the Values from the Teach Mode
To create a new program from the Teach Pendant, select the "Teach" option from main menu. The screen will change to:

**Image 8.**

Select the "Teach" button.

Press “Teach”.

**Image 9.**

Select the “Line” button.

Then Select ‘Head1’ or ‘Head2’ valve. Press X+, X-, Y+, or Y- buttons as required to move the heads. Press Z+ or Z- to move head position Up to Down.
Also enter the speed.

Current positions are displayed on screen.

When you are satisfied with position press "finish" button.
Then again Press X+, X-, Y+ or Y- buttons as required to move the heads to a second point.

Press "finish" button.

Repeat the procedure for other points to coat.
Then press the "X" in the upper right corner of the dialog box to CLOSE the window.

It will ask you to save the data. Click "Yes" to save the Program.

When you create the program in "Teach Mode", after finishing your teaching and saving the program open again from "File" menu and "Open" option.

To open the file which is created in the Teach Mode go to “Teach” mode and select Open Option from Main Menu, your screen will change to:
6.4.4 Edit the Earlier Profile

You can edit the program with "File" option from Main menu. Select "Open" option. Then select the file where your program is saved. The screen will change. Now open this file again with "File" menu "Open" option.
Image 18.

Press “Ok”.

Image 19.

To edit the "Line", select the line and press "Modify" and then "Edit" option.
Image 20.

Make the changes you prefer. Check whether proper valve is selected or not speed is correct, Z position is right and press “Ok”.

Image 21.

After finishing editing press the "finish" button.
Image 22.

It will ask you to save the data.

Image 23.

Save the file with “Ok” button.
6.5 Setting of Parameters

Select the utilities option from the main menu. Then Select "Setup" and then "Machine Parameters" option. The screen will look like:

Select value parameters button.
6.6 Purge Valve

Select "Purge" option from main menu. You can purge two heads separately.

This stage is a precoating application so it is used to ensure the valve is spraying or dispensing correctly before running a program trial. The "Purge" drop down is selected for the valve and it is cleared into the coating cups.

6.7 Load the Program

1) Select the download option from the main menu.
2) Select the File which you want to download.
3) To check the program without dispensing the coating material, you can use “Dry Run Option”. 

Image 27.

The screen will change to:

Image 28.

Select the file "linetest" and press “Ok”.

Now your screen looks like:
6.8 Run the Program

Press “Run” button from the screen to run the latest program downloaded to coating machine. The screen will change to:

Image 30

Press “start” button to start the process and you can stop in between with “stop” button.
7.0 Troubleshooting

7.1 In the Event of Operational Difficulty

Some difficulties when using the system can be solved by the operator or by the maintenance team. Other issues may require contacting our service department. In the event that the problem cannot be solved contact GPD-Global for technical support. Please consult the user guide first when a fault occurs. Before contacting the GPD-Global service department, please make the following notes:

1) Record all information on the system at the time the problem occurred.
2) Record the operation process when the fault occurred including when it occurred and what occurred.
3) If the fault is minor, attempt to repeat it. If the error is not repeatable then it could be operator error.

In order to better diagnose machine faults, all maintenance records should be kept up to date including replacement parts and service records.

7.2 Fault Diagnosis

<table>
<thead>
<tr>
<th>Operation</th>
<th>Other Symptoms</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn system &quot;ON&quot;. The PC has no power.</td>
<td>Cables are loose or not connected</td>
<td></td>
<td>Tighten the cables and take corrective action</td>
</tr>
<tr>
<td>The electrical enclosure does not have power</td>
<td>Enclosure Open so Safety switch is ON</td>
<td></td>
<td>Close the Enclosure</td>
</tr>
<tr>
<td></td>
<td>Fuse Blown</td>
<td></td>
<td>Change the Fuse</td>
</tr>
<tr>
<td>Operation</td>
<td>Other Symptoms</td>
<td>Possible Cause</td>
<td>Corrective Action</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Homing the axes.</td>
<td></td>
<td>Home sensor Out of Position</td>
<td>Press the Emergency stop. Move the axis and realign the Home sensor and check the Gap</td>
</tr>
<tr>
<td>The head moves past the Home Sensor and</td>
<td></td>
<td>Senor Cable Loose or disconnected</td>
<td>Connect the sensor properly</td>
</tr>
<tr>
<td>hits the hard stop.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error during Homing sequence.</td>
<td>Axes not moving.</td>
<td>Fuse is blown.</td>
<td>Replace the Fuse.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stepper Motor cable loose or disconnected.</td>
<td>Connect it properly.</td>
</tr>
<tr>
<td>x, y, or z axis does not move.</td>
<td>Head can be moved freely when power is &quot;ON&quot;.</td>
<td>The Emergency STOP button is depressed.</td>
<td>Release the Emergency STOP button.</td>
</tr>
<tr>
<td></td>
<td>PC indicates system running properly.</td>
<td>Fuse is Blown.</td>
<td>Replace the Fuse.</td>
</tr>
<tr>
<td>Axis loses its position.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The axis speed is set to high.</td>
<td>Check the speed settings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coupling is loose or slipped.</td>
<td>Check and tighten the coupling.</td>
<td></td>
</tr>
<tr>
<td>Pneumatic actuator failure.</td>
<td>Pneumatics operates slowly.</td>
<td>Air valve on regulator on &quot;OFF&quot; position or at low pressure.</td>
<td>Open the Air Valve and adjust the air pressure.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blocked or restricted air line.</td>
<td>Check and do corrective action.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loose fitting connection.</td>
<td>Tighten connection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Damaged air line.</td>
<td>Replace the air line.</td>
</tr>
</tbody>
</table>

### 8.0 Maintenance and Servicing

**WARNING:** Maintenance procedures should be completed by qualified and trained personnel. The GPD-Global service department can perform the maintenance or train customer personnel. Contact the GPD-Global service department for more information on available services.

### 8.1 Schedule

<table>
<thead>
<tr>
<th>Type of Service</th>
<th>Every Shift</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Quarterly</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spray and Dispensing Systems</strong></td>
<td>Check fluid pressures.</td>
<td>Check for any coating on all fixtures and surfaces and clean as necessary. Check for leaks around fittings and tighten or replace as necessary.</td>
<td>Check the fluid pipes for wear.</td>
<td></td>
</tr>
<tr>
<td><strong>Electro-Mechanical Components</strong></td>
<td></td>
<td>Check stepper motors for overheating and smooth operation. Check for any chaffing of wires, pneumatic of material pipes. Maintain air filter on regulator</td>
<td>Grease ball screw slides</td>
<td>Inspect all moving cables for excessive wear.</td>
</tr>
<tr>
<td><strong>Pneumatics</strong></td>
<td></td>
<td>Check for correct operation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Purge Cups</strong></td>
<td>Clean daily.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Valve Tips</strong></td>
<td>Clean daily.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8.2 Inspection Procedures

The cables in the flexible coupling should be checked for excessive wear. Any worn cables should be replaced.

8.2.1 Valves

The valves should be maintained as per the Valve Operation procedures in the Valve Manuals.

8.2.2 Pressure Differential Switch Setup

1) Turn on the extraction to full power.

2) Check the operation of the pressure switch input. The input should be "ON".

3) Turn off the extraction. Ensure the pressure switch input turns "OFF".

4) Lower the extraction rate until there is 200-220 CFM at the extraction port.

5) Repeat the pressure switch input test. If the pressure switch is "OFF" adjust until input just "ON".

6) Turn off the extraction and check pressure switch output turns "OFF".

7) Lower the extraction rate to 160-180 CFM at the extraction port.

8) Check that the pressure switch input turns "OFF". If the Input stays "ON", SLOWLY turn the adjustment screw clockwise until the input turns "OFF". If this occurs, re-check the input. The input should still turn "ON" with the 200-220 CFM.