

3D Systems Inc.

Buildstation Control Software User's Guide

Software Version 5.0

P/N 22135-M10-00

This User Guide (the "Guide") is licensed to the User for an indefinite period, subject to recall by 3D Systems, ("3D") at any time upon return of any fees paid by the User at the time of receipt of this Guide. The Guide at all times remains the property of 3D. The information contained in this Guide is confidential to 3D and may not be given to anyone outside the recipient's (User's) company. Furthermore, this Guide may not be copied or reproduced in any form whatever.

3D makes no warranties which extend beyond the descriptions contained in this Guide, and <u>NO warranty of merchantability in respect to the equipment,</u> <u>machinery, systems and products derived or resulting hereunder</u>. The User assumes all risks and liability for results obtained by the use or implementation of the software described herein, whether used singly or in combination with other designs or products. 3D makes no warranty that the equipment, machinery, systems and products derived or resulting from the software licensed to the user by 3D hereunder will not infringe the claims of domestic or foreign patents. Except for the negligence of 3D, its agents, representatives or employees, user shall protect, indemnify and save harmless 3D of and from any loss, cost, damage or expense arising from any claim that is in any way associated with the software described in this guide. 3D shall not be liable for any special or consequential damages.

Data presented in examples do not necessarily reflect actual test results and should not be used as design criteria.

By acceptance of this Guide, the User agrees to the above conditions and further agrees to comply with the Export Control Regulations of the United States of America.

The following are trademarks of 3D Systems: SLA 350, SLA 500, SLA 3500 SLA 5000, SLA 7000, and 3D.

Windows, Windows NT and MS-DOS are registered trademarks of Microsoft Corporation.

Copyright © 1999 3D Systems

All Rights Reserved.



i

Table of Contents

Software Installation Instructions	1
Installing Buildstation 5.0	1
Overview	1
Installing the New Software	1
Preserving Your Calibration Files	3
Obtaining and Installing Your Buildstation 5.0 Software License	4
Verify and Complete the Installation of Your New Software	5
Buildstation Control Software User's Guide	7
Before You Begin	7
SLA Buildstation Documentation	7
Symbols Used in this Guide	7
Laser and Chemical Safety	8
Cursor Pointer and Mouse Conventions	8
Cursor	8
Pointer	8
Mouse	8
Windows NT [®] 4.0	9
Last Minute Changes	9
3D Systems Support Services	9
Product Support Elsewhere Throughout the World	9
3D Systems Internet Website	9
Getting Started	10
Introduction to SLA Buildstation Software	10
Transferring a Build File to Your SLA System	10
Launching the Buildstation Program	11
Touring the Buildstation User Interface	13
The Title Bar	14
The Main Menu Bar	14
The Toolbars	15
The Status Bar	15
The Build Job Project frame	16
The Build Job Options frame	17
The Part Dimensions frame	18
The Build Job Parameters frame	19
The Build Status frame	20
The Image frame	20
System Setup	21
Setting the Thermostat	21
Setting the Elevator Start Position	23



ii	Table of	Contents

Choosing a Resin File	27
Adding a New Resin File	29
Deleting a Resin File	30
Selecting a Geometric Calibration File	31
Essential Concepts: Steps to Prepare the SLA and Start the Build	33
Installing a Build Platform	33
Adding Projects and Jobs	36
Starting the Build	<i>39</i>
Observing Build Progress	<i>40</i>
Completing the Build	41
Advanced Part Building Techniques	42
Adjusting the Build Job Options	42
Viewing the Part Dimensions (CAD units)	<i>43</i>
Adjusting the Build Job Parameters	44
Adjusting Parameters	45
Draw Speed Ceilings	45
Scale Factors	46
Z Build Range (CAD units)	46
Part Copies	47
Add	49
Delete	49
Spacing	50
Positioning	51
Suppress Copy	51
Pausing, Stopping and Restarting a Build	52
Pausing a Build	52
Restarting a Paused Build	52
Stopping a Build	53
Restarting a Stopped Build	54
Suppressing a Copy	57
Recovering the Recoater Blade to the front of the Vat	58
Other Buildstation Features	60
Remote	60
Motion Control	63
Telephone	69
Setting Telephone Paging for Buildstation 5.0 with Windows NT 4.0	71
SLA Performance Characteristics	73
Laser Power Limits	75
Field Service	76
A diust Resin Volume	78
Level Resin	80
Stir Resin	81
Write ABRA Log	83
Write Sensor Log	84



iii

Customize	. 85
Part Position	. 86
Automatic Copy Placement	. 86
On New Jobs	87
Network	87
Build Options	. 87
Image frame	. 88
Sizable Build Status and Image frames	. 88
To Resize a frame:	. 88
Scroll Bars	89
Viewing the Image	. 89
Maximum Bitmap Size	90
Enabled	90
Visible	90
Title	. 91
Ver. Dim	. 91
Hor. Dim	. 91
Border	91
Fill	. 91
Hatch	91
Progress	. 91
Buildstation Toolbar Functions	. 92
Build Toolbar	. 93
Main Motion Toolbar	. 94
Other Motion Toolbar	. 95
Telephone Toolbar	. 96
Motion Control Toolbar	. 96
Buildstation Main Menu Functions	. 97
File	. 97
New Build Window	. 97
Close Build Window	. 97
Print Build Settings	. 97
Print Preview	. 97
Print Setup	98
Exit	. 98
Edit	. 98
Undo	. 98
Cut	. 98
Capy	. 98
Paste	. 98
View (Toolbars)	. 99
Toolbars	. 99
	. 99
Build	. 99



	Table of Contents	Buildstation Control Software User's Gu
	Motion Control Dialog	
	Main Motion	
	Other Motion	
	Telephone	
V	iew (Status Bar)	
	Status Bar	
B	Build	
	New Build Window	
	Build Part	
	Delayed Build	
	Pause Build	
	Stop Build	
	Restart Build	
	Preview Part	
S	etup	
	Motion Control	
	Choose Resin	
	Choose Geometric Calibration	ı File
	Thermostat	
	Go to Elevator Start Position .	
	Adjust Resin Volume	
	Level resin	
	Stir Resin	
	Telephone	
	SLA Performance Characteris	tics
	Laser Power Limits	
	Field Service	
	Write ABRA log	
	Write Sensor Logs	
	Customize	
И	Vindow	
	Cascade	
	Tile	
	Arrange Icons	
H	Ielp	
	About WinSLA	
n	ndicas	1
	ншисы	<i>I</i>
c.	• • • • • • • • • • • • • • • • • • • •	



4

Buildstation Control Software User's Guide

 \mathcal{V}

List of Figures

Figure 1. Desktop Shortcut Buildstation Icon	. 11
Figure 2. Windows Start Button	. 11
Figure 3. Buildstation menu	12
Figure 4. The Buildstation User Interface	13
Figure 5. The Title Bar	14
Figure 6. The Main Menu Bar	14
Figure 7. The Toolbars	15
Figure 8. The Status Bar	15
Figure 9. The Build Job Project frame	16
Figure 10. The Build Job Options frame	17
Figure 11. The Part Dimensions frame	18
Figure 12. The Build Job Parameters frame	19
Figure 13. The Build Status frame	20
Figure 14. The Image frame	20
Figure 15. Setup Thermostat Pull Down Menu	22
Figure 16. Thermostat Dialog Box	22
Figure 17. Motion Control dialog button	23
Figure 18. Setup Motion Control Pull Down Menu	24
Figure 19. Motion Control Dialog Box	25
Figure 20. Setup Choose Resin Pull Down Menu	27
Figure 21. Choose Resin File Dialog Box	28
Figure 22. Add New Resin Dialog Box	29
Figure 23. Delete Resin Type box	30
Figure 24. Setup Select Geometric Calibration File Menu	31
Figure 25. Select Geometric Calibration File Window	32
Figure 26. Motion Control dialog button	33
Figure 27. Setup Motion Control Pull Down Menu	34
Figure 28. Motion Control Dialog	35
Figure 29. Build Job Project Frame	36
Figure 30. Adding New Job and Selecting New Build File	37
Figure 31. Build file Assigned to Newly Created Job	38
Figure 32. Build file Assigned to Newly Created Project	38
Figure 33. Start Build button	39
Figure 34. Build Status Frame	40
Figure 35. Build Job Options Frame	42
Figure 36. Part Dimensions and Restart Position Box	43
Figure 37. Build Job Parameters Frame	44



vi	List	of	Figures
		~,	

Figure 38. Draw Speed Ceilings Box	45
Figure 39. Scale Factors Box	46
Figure 40. Z Build Range (CAD units) Box	46
Figure 41. Part Copies Box	47
Figure 42. Part Position Dialog Box	48
Figure 43. Number of Copies Dialog Box	49
Figure 44. Copy Spacing Dialog Box	50
Figure 45. Pause Build button	52
Figure 46. Start Build button	53
Figure 47. Stop Build button	53
Figure 48. Stop build? Message Box	53
Figure 49. Restart Build button	54
Figure 50. Winsla5\Output\BuildLog Window	55
Figure 51. Remote Dialog Box	61
Figure 52. Remote [SLAname] Dialog Box	62
Figure 53. Setup Motion Control Pull Down Menu	63
Figure 54. Motion Control dialog button	64
Figure 55. Motion Control Dialog Box with Elevator Selected	66
Figure 56. Motion Control Dialog Box with Vat Selected	67
Figure 57. Motion Control Dialog Box with Recoater Selected	68
Figure 58. Setup Telephone Pull Down Menu	69
Figure 59. Telephone button	70
Figure 60. Telephone Dialog Box	71
Figure 61. Setup SLA Performance Characteristics Menu	73
Figure 62. SLA Performance Characteristics Dialog Box	74
Figure 63. Setup Field Service Pull Down Menu	76
Figure 64. Field Service Dialog Box	77
Figure 65. Setup Adjust Resin Volume Pull Down Menu	78
Figure 66. Adding Resin Warning Box	79
Figure 67. Adjust Resin Volume button	80
Figure 68. Setup Level Resin Pull Down Menu	80
Figure 69. Level Resin button	81
Figure 70. Setup Stir Resin Pull Down Menu	82
Figure 71. Stir Resin Dialog Box	82
Figure 72. Setup Write ABRA Log Pull Down Menu	83
Figure 73. Setup Write Sensor Logs Pull Down Menu	84
Figure 74. Setup Customize Pull Down Menu	85
Figure 75. Customize Dialog Box	86
Figure 76. Image Frame Showing Views	88
Figure 77. Image Setup and Zoom Window	89
Figure 78. View Setup Dialog Box	90
Figure 79. The Toolbars	92



Buildstation	Control	Software	User's Guide
		./	

Figure 80. The File pull-down menu	97
Figure 81. The Edit pull-down menu	
Figure 82. The View Toolbars pull-down menu	99
Figure 83. The View Status Bar pull-down menu	100
Figure 84. The Build pull-down menu	101
Figure 85. Delayed Build Dialog Box	102
Figure 86. The Setup pull-down menu	103
Figure 87. The Window pull-down menu	106
Figure 88. Four cascading open Build windows	106
Figure 89. Four tiled open Build windows	107
Figure 90. The Help pull-down menu	108
Figure 91. About Buildstation Dialog Box	108





Software Installation Instructions

Installing Buildstation 5.0

Overview

This section of the document tells you how to:

- Install the Buildstation 5.0 software from the CD.
- Obtain and install your license.
- Verify that your new installation is working properly.

Installing the New Software

As with most Windows software, Buildstation 5.0 comes with an automated setup routine. During installation, this setup routine performs automatic checks on your system, asks a series of questions about how you want to configure Buildstation 5.0, and, based on your answers to these questions, copies several files to the SLA system's hard disk. It then decompresses the files, writes data to areas of your system's registry, and creates shortcuts to the program for your Windows "Start" menu.

Your SLA system may be running Windows NT 3.51 or Windows NT 4.0. Buildstation 5.0 runs equally well under either operating system. Regardless of which operating system is running, the installation steps are the same. The main differences relating to program installation and program execution between the two versions have to do with where they store links to the executables. Whereas Windows NT 3.51 uses Program Manager and Program Groups, Windows NT 4.0 uses the Taskbar and shortcuts for storing the links.

The following instructions, then, will serve as instructions for both systems.

--IMPORTANT!--

DO NOT OVERWRITE the installation of the Buildstation 4.1.1 software that already resides on your SLA when you install Buildstation 5.0. You should keep your existing setup intact so that it can function as a "backup" in the event of any problems with the newly installed Buildstation 5.0. The new software will co-exist peacefully with the version of the software that currently resides on your SLA.



-NOTE-

If you normally use a virus protection program on your PC, turn it off, or override its monitoring of the system before installing Buildstation 5.0. After Buildstation 5.0 installation is complete, restart your virus protection program.

- 1. Insert the CD labeled "Buildstation 5.0 SLA Control Software for Windows NT" into your SLA's CD-ROM drive.
- If you are running Windows NT 3.51, go to the Windows Program Manager, and click "File > Run...", or, if running Windows NT 4.0, click on the Windows "Start" button, in the lower-left corner of the Windows "Taskbar" then highlight and click the "Run" command.
- 3. Click inside the "Open" box and type the command "d:\Setup.exe" where "d" is the letter designation for your CD ROM drive. (Alternatively, you can use the "Browse" button to browse to the "Setup.exe" file.) Click the "OK" button. This launches the Buildstation Setup program.
- 4. When the "Welcome" screen appears, click the "Next" button.

2

Please read Step 5 carefully. It is very important that you preserve your existing installation of Buildstation 4.1.1 so that if any problems occur with the new software, you can re-activate your older version of the program and continue to produce parts.

5. When the "Choose Destination Location" screen appears, notice that "C:\WinSLA5" appears as the default "Destination Folder." Accept this location by clicking the "Next" button.

If you must alter the destination folder, make sure you do not enter the name of the folder that contains your existing Buildstation 4.1.1 installation. Usually, the name of the Buildstation 4.1.1 installation folder is "C:\WinSLA."

6. When the SLA Machine Selection window appears, click the radio button next to your SLA machine type, then click "Next." Answer any other question(s) about your SLA machine that may be presented.



- 7. When the "Select Program Folder" screen appears, click "Next." By default, this will place a program icon in the "Buildstation5" program group which will aid in the launching of the Buildstation 5.0 program.
- 8. When the "Start Copying Files" screen appears, click "Next" to begin the transferring and installing the program files.
- 9. At the conclusion of all activity, the "Setup Complete" screen appears. Click "Finish."

Preserving Your Calibration Files

The next set of steps are very important in preserving your machine specific calibration data.

- 1. Copy (not Move) the "params.dat" file in "C:\WinSLA" into the "C:\WinSLA5" folder. Make sure you leave a copy of the "params.dat in the existing "C:\WinSLA" folder.
- Copy (not Move) all the ".cal" and ".geo" files in "C:\WinSLA\Config" folder into the "C:\WinSLA5\Config" folder. Make sure you leave a copy of all the ".cal" and ".geo" files in the existing "C:\WinSLA\Config" folder.

Your software is now installed and you are ready to obtain and install your license file.



Obtaining and Installing Your Buildstation 5.0 Software License

--IMPORTANT!--

DO NOT ATTEMPT TO LAUNCH Buildstation 5.0 until you have installed the correct license file. Obtaining a license is a multi-step process. Before starting, make sure you have successfully completed the steps to install the software.

- 1. Open a Command Prompt (DOS window). In Windows NT 3.51, you will find the "MS-DOS Prompt" icon in the "Main" program group of Program Manager. In Windows NT 4.0, you will find the "Command Prompt" icon on the Taskbar's "Start" menu.
- 2. Type the command "cd c:\winsla5" and press <Enter>. (If you did not accept the default folder "C:\WinSLA5" as recommended in Step 5 of the installation instructions above, then you must use the DOS "cd" command to change to the folder where you installed Buildstation 5.0 before continuing.)
- 3. Type the command "Imutil Imhostid" and press <Enter>. This command queries your system and returns its unique host identification code.
- 4. COPY THE CODE DOWN. Later, you will install the license file on this machine. License files are machine-specific. If you are installing Buildstation and requesting license files for more than one machine, take steps now to be able to identify this machine later by its unique host identification code.
- 5. REPEAT Steps 1 through 4 of this procedure for each SLA that will be running Buildstation 5.0.
- 6. Having obtained the "Host-ID's" for the processors you wish to license, find the Authorization Code shipped with your software pack, and visit the licensing section of the 3D Systems' website at <u>www.3dsystems.com</u> and follow the instructions to license your installation.

Your licence file will be emailed to you.



- Copy the appropriate license file to the "C:\WinSLA5" folder for each machine.
- 8. Make sure that the name of the license file is "License.dat."

You can now launch Buildstation 5.0.

Verify and Complete the Installation of Your New Software

Once the software is successfully installed and licensed, you will have a "Buildstation 5" program item in your Windows' Start menu or program group.

- 1. Double-click this program item to launch Buildstation 5.0.
- 2. From the menu bar, select "Setup > Choose Geometric Calibration File..."
- 3. From the Choose Geometric Calibration File dialog, select the latest .geo file in the "C:\WinSLA5\Config" folder.

Call Randy Doyle at (661) 295-5600, extension 2499, or via email at doyler@3dsystems.com, if you have any questions or problems with installation or licensing. If you need help, please contact Randy Doyle at 3D Systems; (661) 295-5600 extension 2499.

--IMPORTANT!--

5

Please report any problems you have with the program or this document to 3D Systems' Senior SLA Product Specialist, Mr. Randy Doyle at (661) 295-5600, extension 2499.or via e-mail at doyler@3dsystems.com. Every effort will be made to assist you as promptly as possible.



Software Installation Instructions



Buildstation Control Software User's Guide

Buildstation Control Software User's Guide

Before You Begin

SLA Buildstation Documentation

This user's guide provides detailed information you will need to operate the 3D Systems' Buildstation Software and to build parts on your SLA 350, SLA 500, SLA 3500, SLA 5000 or SLA 7000 Solid Imaging system.

In this guide you will find:

- How to launch the Buildstation program
- A complete explanation of the Buildstation's features and functions, and user interface including menus, dialogs and Toolbar buttons
- · How to setup the Buildstation before part building
- How to start building parts on the SLA
- An explanation of additional features and options
- How to troubleshoot Buildstation problems

Symbols Used in this Guide



7

This symbol designates the accompanying texts or figures as a NOTE, <u>CAUTION</u>, or <u>WARNING</u>.

When accompanied by the word "NOTE", the text and symbol are meant to call attention to a practice whose implementation can save time or prevent subsequent inconvenience to the user.

When the symbol is grouped with texts labeled "<u>CAUTION</u>", the intention is to point out a condition or practice otherwise not covered by another type of symbol that presents a hazard to equipment that may be in the immediate area.

(Continues on the following page...)

If the word "<u>WARNING</u>" is listed with the symbol, the texts highlight a practice or condition otherwise not covered by another type of symbol that presents a hazard to both equipment and personnel that may be in the immediate area.

Laser and Chemical Safety

Thoroughly review all laser and chemical (including resin) safety procedures located in *Appendix C* of the *SLA User's Hardware Reference Manual*, prior to operating the SLA.

Cursor Pointer and Mouse Conventions

Cursor and mouse conventions are described below to facilitate proper operation of the Buildstation software.

Cursor

The cursor is the entry point for a computer. In character-based software, a blinking vertical bar is typically seen on the screen. The cursor is the location where text or number commands are to entered from the keyboard.

Pointer

The pointer is the arrow that moves about on the screen as the mouse is moved. The pointer can also take on forms other than an arrow depending on where it is being placed on the screen. The pointer, in contrast to the cursor, does not blink. Placing the pointer on an object then clicking one of the mouse buttons will command that object to perform a task.

Mouse

8

3D Systems Buildstation software operates by using the mouse buttons.

- The left mouse button is the primary button.
- "Point" means to position the mouse pointer, which appears as an arrow, until the tip of the pointer rests on the object desired for selection.
- "Click or press" means to press and release the left mouse button while pointing to an object with the mouse pointer arrow.

 "Drag" means to press and hold the left mouse button while pointing to an object, then moving the mouse pointer arrow and object together across the screen.

Mouse uses are described in each separate application section of this user guide.

Windows NT[®] 4.0

All the screen shots in this User's Guide were made using Buildstation 5.0 running on Windows NT 4.0. The screens for users on Windows NT 3.51 are slightly different.

Last Minute Changes

All attempts have been made to make this document as complete and accurate as possible. Refer to the <u>Read This First</u> and <u>Release Notes</u> shipped with the software for late-breaking information that could not be included in this printed book.

3D Systems Support Services

Product Support Within the United States and Canada

3D Systems Incorporated 3D Plus Customer Support Center 805 Falcon Way Grand Junction, CO 81502 Telephone: (800) 793-3669

Product Support Elsewhere Throughout the World

International Customers, consult your local 3D Systems Sales Office for the address and phone or FAX numbers of your regional 3D Systems Customer Support Center.

3D Systems Internet Website

9

3D Systems' worldwide website is at www.3dsystems.com, and through it you can access 3D Systems Customer Support.

Getting Started

Introduction to SLA Buildstation Software

The Buildstation Software runs on the SLA system's computer controller and allows the operator to set-up, modify, and control part building on the SLA system. When the operator completes the set-up and commands the system to build, the SLA Buildstation computer controls all SLA system's functions and sub-systems during the build.

The Buildstation software operates in the user-friendly Windows NT environment and provides support for either version 3.51 (SP5) or version 4.0 (SP3) of that operating system.

To operate the Buildstation software, you will need to be familiar with the Windows environment including icons, toolbars, buttons, and menus. Additionally, you will need to know how to use the mouse and keyboard to select options and enter information into the system. *Refer to Appendix B* of this user's guide for more information on the Windows NT operating system.

Transferring a Build File to Your SLA System

Before you can build parts on your SLA system, you must first transfer the desired build file (BFF) created on the *3D Lightyear File Preparation Software* workstation, to your SLA system controller.

These files are usually stored in a special folder on the Buildstation controller (c:\Winsla5\Bff), but may be stored elsewhere in your operation.

Any method that gets the BFF file from the workstation computer to the Buildstation controller will work, but typically users transfer build files through the local area network (LAN) using the Windows NT Explorer, or similar program.

Because the actual method may differ from facility to facility, we recommend you consult with your supervisor or network manager to learn how it is best done in your operation.

Launching the Buildstation Program

There are many ways to launch programs in Windows NT. We explain two methods below.



If a shortcut has been placed on the Windows Desktop, the easiest way to launch the program is to double click the desktop shortcut icon (Figure 1).



Figure 1. Desktop Shortcut Buildstation Icon

If there is no icon on the desktop:

1. Press the Windows "Start" button (Figure 2). This will open the "Start" menu.



Figure 2. Windows Start Button

2. Move the mouse so that the mouse pointer points to the "Programs" folder icon. This will open the "Programs" menu.

(Continues on the following page)

 Again, move the mouse pointer to the "Buildstation5" folder icon. This will open the "Buildstation/Remote" menu (Figure 3).



Figure 3. Buildstation menu

4. Move the mouse pointer and highlight the "Buildstation" icon, then click to launch the Buildstation program.

Touring the Buildstation User Interface



Build Job Options

Figure 4. The Buildstation User Interface

The Title Bar

📥 Buildstation 5.0 - [Build1]

_ 8 ×

Figure 5. The Title Bar

The **Title Bar** (Figure 5) is the strip located along the very top of the Buildstation window. It shows the version of Buildstation Software being used, and the title of the current project.

The Main Menu Bar

<u> F</u>ile <u>E</u>dit <u>V</u>iew <u>B</u>uild <u>S</u>etup <u>W</u>indow <u>H</u>elp

_ 8 ×

Figure 6. The Main Menu Bar

The **Main Menu Bar** (Figure 6) is used to access the various functions in the Buildstation Software. The Main Menu Bar has seven pull-down menu groups. Clicking on any one of the items will open its pull-down menu displaying more items to choose from. To perform that item's function, just click on the item with the left mouse button. Some of the items in the pull-down menus will open yet another submenu of items to choose from when selected.

For complete information about each menu item, refer to *Buildstation Main Menu Functions* later in this guide.

The Toolbars



Figure 7. The Toolbars

The **Toolbars** and associated buttons (Figure 7) are used to perform the various functions in the Buildstation software. The buttons are shortcuts to performing functions also available from the pull-down menus.

For complete information about the function of each toolbar and button, refer to *Buildstation Toolbar Functions* later in this guide.

The Status Bar

Thursday, January 14, 1999 08:15:27 E-000.0000RH S-00.0RF 23.01C~ DESKTOP

Figure 8. The Status Bar

The Status Bar (Figure 8) is the strip along the bottom of the screen. It displays such information as the date and time of day, elevator and sweeper position, and resin temperature.

(Continues on the following page ...)

The Build Job Project frame



Figure 9. The Build Job Project frame

The **Build Job Project** frame (Figure 9) lists all projects on file and provides the ability to group "builds" under a specific project name. The **Build Job Project** frame is where you will select the job that you want to build.

For complete information about how to use the **Build Job Project** frame, refer to **Adding Projects and Jobs** located under *Essential Concepts: Steps to Prepare the SLA and Start the Build* later in this guide.

The Build Job Options frame



Figure 10. The Build Job Options frame

The Build Job Options frame (Figure 10) has seven ON/OFF toggle items with check boxes. Each option is turned ON when a check mark appears in the check box. The Build Job Options frame is used to turn ON or OFF certain features prior to starting a build and diagnostic testing by a 3D Field Service Representative.



NOTE!

To access the options other than "Auto Drain", refer to Customize later in this guide. The options will be available when checking the "Build Options" check box located in the "Customize" dialog box.

For complete information about how to use the Build Job Options frame, refer to Adjusting the Build Options located under Advanced Part Building Techniques later in this guide.

(Continues on the following page...)

The Part Dimensions frame

Part Dimensions	(CAD units)
X: 1.0000	- 16.6001
Y: 1.0000	- 16.6000
Z: 0.5945	- 2.0000
	Restart 0.5945

Figure 11. The Part Dimensions frame

The **Part Dimensions** frame and **Restart** position box (Figure 11) displays the extents of the BFF file selected and the **Restart** position should a stopped build need to be restarted.

For complete information about the **Part Dimensions** frame, refer to **Viewing the Part Dimensions (CAD units)** located under *Advanced Part Building Techniques* later in this guide.

For complete information about Restarting a build using the **Restart** position, refer to **Pausing, Stopping and Restarting a Build** located under *Ad-vanced Part Building Techniques* later in this guide.

-Build Job Parameters Defaults						
Draw Speed Ceilings (in/sec) B 100.000 H 250.000						
Scale Factors X 1.0000 Y 1.0000 Z 1.0000						
Z Build Range (CAD units) O All O Some						
Part Copies						
Copies: 1 Edit Copies						
Build Platform						
 >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>						

Figure 12. The Build Job Parameters frame

The **Build Job Parameters** frame (Figure 12) allows you to modify the machine operation for building and contains the following boxes. The **Draw Speed Ceilings** box, the **Scale Factors** box, the **Z Build Range** box, and the **Part Copies** box.

For complete information about how to use the **Build Job Parameters** frame, refer to **Adjusting the Build Job Parameters** located under *Advanced Part Building Techniques* later in this guide.

(Continues on the following page...)

The Build Status frame

BUILD STATUS			
Component: -	Action:		
Start Time: Thu Jan 14 08:24 AM	Laser Power:		Dip Dist: -
Est. End Time: -	Border Speed:	-	Pre Dip: -
End Time: Thu Jan 14 08:24 AM	Hatch Speed:		Z Waiti -
On Layer: -	Fill Speed:	•	Sweeps: -
Geo Cal File: C:\WINSLA\500.geo	Resin:	sl5195	SwpVel: -

Figure 13. The Build Status frame

The **Build Status** (Figure 13) frame shows specific information on the build as it progresses.

For complete information about each item on the **Build Status** frame, refer to **Observing Build Progress** located under *Essential Concepts: Steps to Prepare the SLA and Start the Build* later in this guide.

The Image frame



Figure 14. The Image frame

The **Image** frame (Figure 14) is used to show build images in various views of the object(s) being built during both build previews and actual builds.

For complete information about how to use the **Image** frame, refer to **Image** frame located under *Other Buildstation Features* later in this guide.

System Setup

The information presented in this section contains procedures and processes that should have already been completed either by your 3D Systems' Field Engineer during the installation of your SLA system, or by your supervisor as part of regular maintenance.

If your system is setup and ready to accept build jobs, you can skip this section on *System Setup* and go directly to *Essential Concepts: Steps to Prepare the SLA and Start the Build.*

Setting the Thermostat

The thermostat controls the resin vat heater and must be set to provide a constant temperature and stable part building environment within the SLA system. The resin type determines the desired temperature setting. Information on the proper build temperature is included in the documentation provided with each shipment of resin.



NOTE!

Setting the Thermostat is usually a one time procedure unless something has been changed on the SLA such as a change of resin or after service work has been performed to hardware or software.

To set the Thermostat:

1. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 15).

(Continues on the following page ...)

Setup Window Help					
Motion Control					
Choose <u>R</u> esin Choose G <u>e</u> ometric Calibration File					
<u>T</u> hermostat					
<u>G</u> o to Elevator Start Position <u>A</u> djust Resin Volume Level Resin St <u>i</u> r Resin					
Telephone					
SLA <u>P</u> erformance Characteristics Laser Power Limits Field Service					
Write A <u>B</u> RA Log <u>W</u> rite Sensor Logs					
<u>C</u> ustomize					

Figure 15. Setup Thermostat Pull Down Menu

2. Click "<u>Thermostat...</u>" from the "Setup" pull-down menu to open the "Thermostat" dialog box (Figure 16).



Figure 16. Thermostat Dialog Box

- 3. Click the "Fahrenheit" check box if you wish to display the thermostat setting in degrees Fahrenheit. To display the thermostat setting in degrees Celsius, leave the box unchecked.
- 4. Press the "Up" or "Down" buttons to reach the desired thermostat setting.
- 5. Press the "OK" button to save the new setting.



NOTE! If the SLA system has been off for an extended period of time, the resin will not be at the proper temperature. Once the system is powered on, it could take up to 36 hours to reach the proper operating temperature. Do not attempt to build

Setting the Elevator Start Position

parts before the temperature stabilizes.

The elevator's ideal build start position is when the build platform perforation holes are half submerged into the resin when the resin is at a level condition.



NOTE!

Setting the "Elevator Start Position" is performed by the 3D Systems' Field Engineer during installation and should not need to be reset.

To set the Elevator Start Position:

1. Press the "Motion Control Dialog" button located on the toolbars (Figure 17) to open the "Motion Control" dialog box (Figure 19).



Figure 17. Motion Control dialog button

(Continues on the following page...)

-OR-

2. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 18).

<u>S</u> etup	<u>W</u> indow <u>H</u> elp					
<u>M</u> otic	n Control					
Choo Choo <u>T</u> herr	se <u>R</u> esin se G <u>e</u> ometric Calibration File nostat					
<u>G</u> o to Elevator Start Position Adjust Resin Volume Level Resin St <u>i</u> r Resin						
Telep	hone					
SLA <u>P</u> erformance Characteristics Laser Power Limits Field Service						
Write <u>W</u> rite	Write A <u>B</u> RA Log <u>W</u> rite Sensor Logs					
<u>C</u> usto	omize					

Figure 18. Setup Motion Control Pull Down Menu

3. Click "Motion Control..." from the "Setup" pull-down menu to open the "Motion Control" dialog box (Figure 19).

For complete information on how to use Motion Control, refer to **Motion Control** located under *Other Buildstation Features* later in this guide.

Motion Control 🛛 🛛 🗙							
Axis Elevator ⊻at Recoater 	Position 0.0000R 0.00000R 0.0R	Sensor HOME	Limits TOP BOTTOM TOP BOTTOM FRONT BACK				
Elevator Movement							
Acc. 0.2000	Vel. 0.100	0 Dist	1.0000 +/-				
0.050 - 1.000 0.001 - 0.100 -36.000 - 36.000							
<u>M</u> ove <u>S</u> top							
	Home	Go To Star	t Set Start Pos				
Down Start Pos = 0.0000							
Resin Level							
Diff/Sum = 0.00	00 тос) HIGH					
134							
134							

Figure 19. Motion Control Dialog Box

- 4. Click the "Elevator" radio button in the "Axis" section of the "Motion Control" dialog box to select the "Elevator" as the active component.
- 5. Press the "Home" button to send the elevator to its "Home" position.
- 6. Press the "Go To Start button" to send the elevator to the default or last saved start position.
- 7. Click the "Vat" radio button in the "Axis" section of the "Motion Control" dialog box to select "Vat" as the active component.
- 8. Press the "Level to 0.0### Gap" button to level the resin. Add resin if needed.

(Continues on the following page...)

- 9. Click the "Elevator" radio button in the "Axis" section of the "Motion Control" dialog box to select the "Elevator" as the active component.
- 10. Using the "Up" and "Down" buttons, position the platform until its perforation holes are half submerged in the build resin.
- 11. Repeat steps six through nine until the perforation holes on the platform remain half submerged and the resin is level.
- 12. Press the "Set Start Position" button to save the new elevator start position.
- 13. Close the "Motion Control" dialog box by clicking the "X" button in the upper right corner.



NOTE!

If you are running Windows NT 3.51, the procedure for closing the dialog box may be different.
Choosing a Resin File

You must choose, or create, a resin file to match the characteristics of the resin in your SLA system. Every SLA can use one or more resin types depending on the parts being built and the type of recoater system in use. The Buildstation software includes resin files to match the many CIBATOOL resins offered by 3D Systems.

To Choose a Resin file:

1. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 20).

<u>Setup</u> <u>W</u> indow <u>H</u> elp
Motion Control
Choose <u>R</u> esin
Choose G <u>e</u> ometric Calibration File <u>T</u> hermostat
<u>G</u> o to Elevator Start Position <u>A</u> djust Resin Volume <u>L</u> evel Resin St <u>i</u> r Resin
Tele <u>p</u> hone
SLA <u>P</u> erformance Characteristics Laser Power Limits Field Service
Write A <u>B</u> RA Log <u>W</u> rite Sensor Logs
<u>C</u> ustomize

Figure 20. Setup Choose Resin Pull Down Menu

2. Click "Choose Resin..." from the "Setup" pull-down menu to open the "Choose Resin File" dialog box (Figure 21).

27

(Continues on the following page...)

(Continued from]	preceeding page)	
-------------------	------------------	--

Choose Resin File			
SI 5195 z- Dofault	Resin Inform	ation	
SL5195T	Name SL	5195	
SL5510-5 SL5510T-5	Parameters		
SL5520-5 SL5530X-5	Dp	Ec	Preferred Blade Gap
SLI5530T-5	5.2	13.1	0.0040
	mils	mJ/sq.cm	inches
	Undo C	hanges Sav	ve Changes
	Syst	em Blade Gap: 0.0)040
Add New Delete	Set as Defa	ult Resin	Jse for this Job
	Canc	el	ОК

Figure 21. Choose Resin File Dialog Box

- 3. The available resin file names appear in the window of the dialog box. Figure 21 shows an example of the default resin files encoded in the software, although your SLA system may show different file names depending on the model.
- 4. Click the appropriate resin file name that you desire to build with.
- 5. Press the "Set as Default Resin" button if you wish to make this resin file your default.



NOTE!

If you do not select a resin file name as your default, the "Choose Resin File" dialog box will open when you begin the next build.

6. Press the "OK" button to save your changes.



Adding a New Resin File

For many, the default resin files will be all they ever need to use for part building. Some users create new resin files based on system measurements made with the 3D Systems' **AccuMax Peak Performance Toolkit** or the installation of a newly available resin. Since the default resin files cannot be changed (or deleted), you can create a new resin file with a new name and new values without risk to the default resin files.

To add a new resin file:

1. From the "Choose Resin File" dialog box, Press the "Add New" button to open the "Add New Resin" dialog box (Figure 22).

Ado	l New Re	sin		×
Г	Resin Name-			
	Resin Parama	eters		
	Dn	Fo	Preferred Blade Gap	
	0	0		
	mils	mJ/sq.cm	inches	
	Ok	(Cancel	

Figure 22. Add New Resin Dialog Box

2. Type the desired name for the new resin file in the text box under "Resin Name".

(Continues on the following page...)

3. Type in the desired "Dp", "Ec", and "Preferred Blade Gap" values for the new resin file in the appropriate text boxes.

Be sure to use the correct unit of measurement.

- 4. When complete, press the "OK" button. The new resin file appears in the window with the default resin files.
- 5. To select the newly added resin file for part building, use the same method as selecting a default resin file described in the previous section.



NOTE!

You can make changes to your custom resin file by entering new "Dp", "Ec", and "Preferred Blade Gap" values in text boxes in the "Choose Resin File" dialog box, then pressing the "Save Changes" button

Deleting a Resin File

User-created resin files can be deleted. Default resin files cannot be deleted.

To delete a resin file:

- 1. From the "Choose Resin File" dialog box, click the file name of the resin file you want to delete.
- 2. Press the "Delete" button.
- **3.** Press "Yes" in the Delete Resin Type confirmation box (Figure 23).



Figure 23. Delete Resin Type box

Selecting a Geometric Calibration File

During installation, and occasionally during system maintenance, your 3D Systems Field Engineer will run a geometric calibration on your SLA system. That calibration creates a file, stored in a file folder on the controller's hard disk, that is required for accurate part building.

A geometric calibration file name looks something like this: 991202145630.GEO. The file name represents the year, month, day, and time of day that the calibration was performed.

To select a geometric calibration file:

1. From the Buildstation Main Window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 24).

<u>Setup</u> <u>W</u> indow <u>H</u> elp
Motion Control
Choose <u>R</u> esin
Choose Geometric Calibration File
<u>T</u> hermostat
<u>G</u> o to Elevator Start Position
Level Resin
St <u>i</u> r Resin
Tele <u>p</u> hone
SLA <u>P</u> erformance Characteristics Laser Power Limits Field Service
Write A <u>B</u> RA Log Write Sensor Logs
 Customize

Figure 24. Setup Select Geometric Calibration File Menu

2. Click "Choose Geometric Calibration File..." from the "Setup" pull-down menu to open the "Choose Geometric Calibration File" window (Figure 25).

(Continues on the following page ...)

Select Geo	ometric Calibration File				? ×
Look jn:	🔁 Config	•	£	d	8-8- 8-6- 8-6-
99120214	5630.geo				
File <u>n</u> ame:	991202145630.geo				<u>O</u> pen
Files of type:	Geo Files (*.geo)		-		Cancel

Figure 25. Select Geometric Calibration File Window

- 3. Navigate to the "Winsla5\Config" directory to locate the desired file.
- 4. Click the desired file, then press the "Open" button to select the desired file.

Essential Concepts: Steps to Prepare the SLA and Start the Build

This section describes the necessary steps to deliver, select, and start a new part build on your SLA system. It assumes the system is powered on and ready to start building. If this is not the case, please review the information on powering on and preparing the system in the *SLA User's Hardware Reference Manual*.

The following sections list the essential steps necessary to begin building. As an overview of the process, we list those steps here.

- 1. Installing a build platform
- 2. Adding and selecting a job
- 3. Adjusting the build parameters
- 4. Starting the build
- 5. Observing build progress
- 6. Completing the build

Installing a Build Platform

Before installing a build platform, make sure it is clean and free of polymerized resin.

To install a build platform:

1. Press the "Motion Control Dialog" button located on the toolbars (Figure 26) to open the "Motion Control" dialog box (Figure 28).

a dame

Figure 26. Motion Control dialog button

(Continues on the following page ...)

-OR-

2. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 27).

<u>Setup</u> <u>W</u> indow <u>H</u> elp
Motion Control
Choose <u>R</u> esin Choose G <u>e</u> ometric Calibration File <u>T</u> hermostat
<u>G</u> o to Elevator Start Position <u>A</u> djust Resin Volume <u>L</u> evel Resin St <u>i</u> r Resin
Tele <u>p</u> hone
SLA <u>P</u> erformance Characteristics Laser Power Limits Field Service
Write A <u>B</u> RA Log <u>W</u> rite Sensor Logs
<u>C</u> ustomize

Figure 27. Setup Motion Control Pull Down Menu

3. Click "Motion Control..." from the "Setup" pull-down menu to open the "Motion Control" dialog box (Figure 28).

Motion Control 🛛 🛛 🗙					
Axis • Elevator	Position 0.0000R	-Sensor- HOME	Limits TOP BOTTOM		
© ⊻at	0.00000R		ТОР ВОТТОМ		
○ <u>R</u> ecoater	0.0R		FRONT BACK		
Elevator Movem	nent				
Acc. 0.2000	Vel. 0.100	0 Dist	1.0000 +/-		
0.050 - 1.000 0.001 - 0.100 -36.000 - 36.000					
<u>M</u> ove <u>S</u> top					
	Home	Go To Star	t Set Start Pos		
Down Start Pos = 0.0000					
Resin Level Diff/Sum = 0.0000					
134 🔳					
134					

Figure 28. Motion Control Dialog

- 4. Ensure the "Elevator" radio button is checked, then press the "Top" button to bring the elevator to its topmost position.
- 5. Attach a clean platform to the platform supports on the elevator.



NOTE!

Each SLA system has its own method of securing a platform to the platform supports. See the *SLA User's Hardware Reference Manual* for detailed instructions for your SLA.

6. Press the "Go To Start" button in the "Motion Control" dialog box to send the platform to its start position.

35

Adding Projects and Jobs

The next step is to add and select the job to build.

The Buildstation 5.0 software allows you to organize builds into Projects, and Jobs within a project. A Project has one or more Jobs and each Job represents a single build file (BFF). You can create new Jobs within existing Projects or create new Projects. The only limit to the number of Jobs in a Project, or the number of Projects is the storage capacity of the hard disk in the controller. Although the software gives Projects and Jobs default names when they are created, you can rename them to whatever makes sense to identify the contents of the Project or Job.

Figure 29 shows the Build Job Project frame and illustrates the project tree with Jobs within Projects.



Figure 29. Build Job Project Frame

Notice in Figure 29 that there is one project named "Dept12_Projects," and that there are two jobs under that project, "Manifold_128B3" and "CylHead_129A7." Notice also that the Job "Manifold_128B3" is highlighted and that the build file name, and path to the build file name, is displayed in the file name window.

Now let's say we want to add a new job. We could either add the new job to the project "Dept12_Projects," or we could add it to a new project.

To add the new job to the existing project "Dept12_Projects":

- 1. Click on any existing job in the project "Dept12_Projects."
- 2. Press the "Add button". The software creates a new job named "New Job" in the project tree and simultaneously opens the "OpenBff" window displaying the available BFF files (Figure 30).

Build Job Project Save Add Delete B A Dept12_Projects New Job Anifold_128B3 CylHead_129A7	Open Look in: ☐ Bff ☐ CylHead_129A7.bff ☐ Manifold_128B3.bff ↓ WingSection_114J3.bff	?× *
C:\WINSLA\Bff Manifold_12883.bff	File name: WingSection_114J3.bff Files of type: BFF Files (*.bff)	<u>O</u> pen Cancel

Figure 30. Adding New Job and Selecting New Build File

3. Click the desired build file and press the <u>"Open"</u> button. This will add and assign the selected build file, "WingSection_114J3.bff" to the newly created job (Figure 31).

(Continues on the following page...)



Figure 31. Build file Assigned to Newly Created Job

To add the job to a new project:

- 1. Click any existing Project.
- 2. Press the "Add" button. The software creates a new project named "New Project", a new job named "New Job1" in the new project, and simultaneously opens the "OpenBff" window displaying the available BFF files (Figure 32).

Build Job Project Save Add Delete Save Add Delete WingSection_114J3 SMW Dept12_Projects Manifold_128B3 CylHead_129A7	Open ? × Look jn: Bff Image: CylHead_129A7.bff Image: CylHead_129B3.bff Image: CylHead_129B3.bff Image: CylHead_129B3.bff
WingSection_114J3.bff	File name: WingSection_114J3.bff Files of type: BFF Files (*.bff) Cancel

Figure 32. Build file Assigned to Newly Created Project

- Click the desired build file and press the "Open" button. This will add and assign the selected build file, "WingSection_114J3.bff" to the newly created job in the newly created project (Figure 32).
- 4. Press the "Save" button to save the new setting.

Starting the Build

Now that you have the build file transferred to the Buildstation computer, the platform installed and ready, and the job selected:

- 1. Check that the "Auto Drain" box in the "Build Job Options" frame contains a check mark indicating that this option is selected and that all other boxes are empty. If not, click them. Then,
- 2. Press the "Start Build" button on the Toolbar (Figure 33) to start the build.



Figure 33. Start Build button

The computer initializes all of the SLA system's hardware, including elevator position, and adjusts the resin volume (add resin if needed, if not done automatically). The laser comes on and the beam searches for, and locates the Beam Profilers. The laser power adjusts for the build. The build begins and the laser draws the first layer of the supports. It is a good idea to observe the first few layers should any problems arise.



NOTE!

A message box will appear if the resin temperature is out of its recommended range. You have the option to continue with the build anyway by pressing on the "OK" button or cancelling the build by pressing on the "Cancel" button.

Observing Build Progress

Once the build has started, the Build Status frame shows specific information on the build as it progresses (Figure 34).

BUILD STATUS		
Component: Rev_kcor_v	Action: 28 Sec	PreDipDelay
Start Time: Tue Mar 09 11:46 AM	Laser Power: 131 mV	/ Dip Dist: 0.000
Est. End Time: Tue Mar 09-08:16 PM (8:29 hrs)	Border Speed: 13.4	Pre Dip: 45
End Time: -	Hatch Speed: 96.7	Z Wait: 30
On Layer: 1.502 in	Fill Speed: -	Sweeps: 2
Geo Cal File: C:\WINSLA_0301\Config\99030111053	Resin: sl5190	SwpVel: 1.0000

Figure 34. Build Status Frame

- **Component:** lists the STL file of the component part being drawn.
- Start Time: shows the time the system began the build.
- Est. End Time: is the software-calculated build completion time.
- End Time: is the actual build completion time. (This entry will be blank until the build is completed.)
- On Layer: shows the current CAD layer building.
- Geo Cal File: reports the Geometric Calibration file in use.
- Action: shows the current machine operation.
- Laser Power: displays the last-read laser power.
- **Border Speed:** is the speed at which the most recent border vector was drawn in inches per second.
- **Hatch Speed:** is the speed at which the most recent hatch vector was drawn in inches per second.
- Fill Speed: is the speed at which the most recent fill vector was drawn in inches per second.
- Resin File: displays the resin type being used for the build.
- **Z Dip Distance:** is the distance in inches that the elevator dips to apply fresh resin to the top of the part or supports during the recoating process before the laser draws the next layer.
- **Pre Dip Delay:** is the time in seconds between the time that the laser finishes drawing until the elevator dips the part or supports into the resin during the recoating process. This delay allows for further curing of the just finished layer.

40

- Z Level Wait: is the time that the recoating and leveling process is complete to the beginning of drawing of the current layer. The Z Wait time period allows for the resin to stabilize before the laser begins to create the current layer.
- Number of Sweeps: is the number of the recoater blade sweeps during the recoating process. The number of sweeps can be from 0 to 7 sweeps.
- Sweep Velocity: is the velocity in inches per second that the recoater blade travels across the vat area.

Completing the Build

If the **Auto Drain** feature was checked before the build, the platform will be positioned above the vat at the completion of the build. If the **Auto Drain** feature was not checked, a message box will appear and ask you if you want to **"Drain part, Yes/No"**. To drain the part, press the **Yes** button.

If you do not want to drain the part at this time, press the **No** button. You can drain the part at a later time by pressing the **Platform to Top** button, located on the toolbars, to bring the platform to its topmost position. Wait approximately 15 minutes for the excess liquid resin to drain from the part.

Using proper safety procedures, open the chamber door and release the platform from its hold down latch. Position the platform at a 45 degree angle leaned against the back of the build chamber allowing the excess resin to completely drain back into the vat. Use paper towels to keep the liquid resin off the back panel. Refer to Appendix C. located in the SLA User's Hardware Reference Manual for laser and chemical safety warnings.

When draining is finished, remove the platform from the build chamber, leaving all other mechanisms in their current places.

Advanced Part Building Techniques

Adjusting the Build Job Options

The **Build Job Options** frame (Figure 35) has seven ON/OFF toggle items with check boxes. Each option is turned ON when a check mark appears in the check box. The **Build Job Options** frame is used to turn ON or OFF certain features during a build or preview build and diagnostic testing by 3D Field Service Engineers.



NOTE!

To access the options other than "Auto Drain", refer to *Customize* later in this guide. The options will be available when checking the "Build Options" check box located in the "Customize" dialog box.

- Build Job Options	- Drawing
	Diawing
L Auto Drain	

Figure 35. Build Job Options Frame

The following steps describe what Build Job Options to select.

- 1. For normal part building operations, select "Auto Drain". A check mark will appear in the check box.
- 2. Uncheck all other boxes for normal part building operations.

Auto Drain-when checked, will raise the elevator to the upper limit upon build completion. This allows resin to drain from the part and platform. Under certain circumstances, you may choose to uncheck, or turn **OFF** the Auto Drain, for example , fragile parts that are best raised with a slower elevator velocity.



Viewing the Part Dimensions (CAD units)

The **Part Dimensions** frame and **Restart** position box (Figure 36) displays the extents of the BFF file selected and the **Restart** position should a stopped build need to be restarted. See **Pausing, Stopping and Restarting a Build** later in this guide.

Part Dimensions (CAD units)				
X: 1.0000		16.6001		
Y: 1.0000		16.6000		
Z: 0.5945	- 2	2.0000		
	Rest	art 0.5945		

Figure 36. Part Dimensions and Restart Position Box

Adjusting the Build Job Parameters

The **Build Job Parameters** frame (Figure 37) allows you to modify the machine operation for building and contains the following boxes. The **Draw Speed Ceilings** box, the **Scale Factors** box, the **Z Build Range** box, and the **Part Copies** box.

When a BFF file is selected by name, its **Draw Speed Ceilings (in/sec)**, **Scale Factors, Z Build Range (CAD units)**, and **Part Copies** are displayed.

You can modify these by entering different values in the corresponding text boxes.

Build Job Parameters
Draw Speed Ceilings (in/sec)
Scale Factors X 1.0000 Y 1.0000 Z 1.0000
Z Build Range (CAD units) C All Some Part Copies
Copies: 1 Edit Copies

Figure 37. Build Job Parameters Frame

44

Adjusting Parameters

The text boxes in Build Job Parameters accept only numeric values.

Nominal values can be returned to all **Build Job Parameters** by pressing the **"Defaults"** button of Figure 37.

Draw Speed Ceilings

The **Draw Speed Ceilings** box (Figure 38) shows the Draw Speed Ceiling values for the laser beam at the vat, The recommended draw speed ceiling values are set to appropriate default values for each machine type. This is done to ensure part accuracy. By setting a draw speed ceiling, the laser will be prevented from drawing faster than the speed shown in the text boxes. Using faster draw speeds than the recommended values, may degrade part accuracy. You can change the values if desired, but only within realistic limits. Box B controls Border speeds while box H controls Hatching speeds.

- Drav	v Speed C	Ceiling	gs (in/sec)—	
вГ	100.000	нΓ	250.000	

Figure 38. Draw Speed Ceilings Box

Scale Factors

The **Scale Factors** box (Figure 39) allows you to enter the scale factors necessary to compensate for part shrinkage. For valid values, refer to the Build-Style Parameters document provided with the resin. You can also determine these values by building Christmas-Tree parts using 3D Systems' **AccuMax Peak Performance Toolkit**.

These parameters can also be provided to you by contacting 3D Plus+ Customer Support at 1-800-793-3669 (U.S. or Canada).

Scaling is used for accuracy; it is not a sizing function (i.e. half scale or 2x). The default for X, Y and Z is set at 1.000. The range is 0.95 to 1.05.



Figure 39. Scale Factors Box

Z Build Range (CAD units)

The **Z Build Range (CAD units)** box (Figure 40) shows the "start" dimension and the "stop" dimension of the selected part(s) to be built. These "start/stop" CAD dimensions are used to build BFF segments.

The **All** radio button, when selected, will build complete parts over their entire Z build range, while the **Some** radio button, when selected, will build segments of parts over some subrange specified by you. When the **All** button is selected, no changes can be made in the text boxes.

-Z Build Range (CAD units)				
O All 📊	0.0000		0.0000	
C Some	0.0000	•	0.0000	

Figure 40. Z Build Range (CAD units) Box

Part Copies

The **Part Copies** box (Figure 41) allows you to build multiple copies of the same build file and also allows you to adjust the spacing and positioning of the build files on the build platform.

The Copies: box displays the number of copies of the build file to be built.

Part Cop	ies —					
Copies:	7	_ [Edit	Copie	s	
_Build P	latform	n				
22						2
22						2
22						2
		00				
000	0,0					
		5 s _], {	\square_{i}		
0.0						
0.0						
						2

Figure 41. Part Copies Box

The following steps describe how to build multiple copies of the same build file and position the build files on the build platform.

1. Press the "Edit Copies..." button.

— Or —

Double-click in the Build Platform area.

This will open the "Part Position" dialog box (Figure 42) which will allow you set the number of copies to be built and to reposition the parts on the build platform.

(Continued from preceeding page	age)	preceeding po	from	Continued
---------------------------------	------	---------------	------	-----------

Part Position	×
	OK Cancel
	Number and Spacing Number 7 Max: 25 Add Delete Spacing 2.000 V Auto-Position
	Positions Index: 6
	Suppression Suppress Copy Unsuppress

Figure 42. Part Position Dialog Box

2. Press the "Number..." button.

This will open the "Number of Copies" dialog box (Figure 43).

Number of (Copies	×
7		OK
Minimum	Maximum	
1	25	

Figure 43. Number of Copies Dialog Box

- 3. Type in the number of copies to be built, for example, "7" or press the "Minimum" or "Maximum" buttons to select the minimum or maximum number of copies that is allowed by the software.
- 4. When finished, press the "OK" button to save.

Add

To add copies using the Add button:

1. Press the "Add" button.



To add copies in either "Square Layout" or "Prefer Rows", select the desired option from the "Customize" dialog box. Refer to Customize later in this guide for information.

Delete

To delete a copy using the **Delete** button:

1. Press the "Delete" button.

49

Spacing

The **Spacing...** button (Figure 42) allows you to manually set the spacing distance between the build file copies on the platform.

The following steps describe how to set the spacing distance between the parts on the platform.

1. Press the "Spacing..." button.

This will open the "Copy Spacing" dialog box (Figure 44).

Copy Spacin	ıg	×
2		OK
Minimum	Maximum	
0.0000	10.0000	

Figure 44. Copy Spacing Dialog Box

- 2. Type in the desired spacing distance in inches into the text box or press on the "Minimum" or "Maximum" buttons to select the minimum or maximum values that is allowed by the software.
- 3. When finished, press the "OK" button to save.

Positioning

To place all the build file copies on the build platform, check the **Auto-Position** check box with a check mark (Figure 42).

The following steps describe how to manually place the build file copies on the build platform.

- 1. Select the copy by clicking on it with the right mouse button (Figure 42).
- 2. While holding down the right mouse button, drag the mouse. The copy will move as the mouse is moved.
- 3. When at the desired position, release the mouse button.
- 4. Press the "OK" button to save.
- Or —
- 1. Select the copy by clicking on it with the left mouse button.
- 2. Change the values in the X= and Y= position text boxes. The copy will move.
- 3. Press the "OK" button to save.

Suppress Copy

The **Suppress Copy** button will allow you to stop the building of a build file copy that may not be building properly without the need to stop the entire build.

For complete information on how to suppress a copy, refer to **Suppressing a Copy** later in this guide.

Pausing, Stopping and Restarting a Build

Pausing a Build

Sometimes it may be necessary to Pause a build. For example, you may need to remove bubbles from the resin, remove a piece of hardened resin floating in the vat, suppress a copy (see **Suppressing a Copy** later in this guide) or for other reasons.

The following steps describe how to Pause a build.

1. To Pause the build, press the "Pause Build" button on the Toolbars (Figure 45).





If there is an action in progress, the software will display a box with a message which reads: "Action in progress, waiting for task to end".

Once it safe to do so, the computer will pause the build and display a box with the following message: "Build Paused Successfully".

2. Press the "OK" button on the message box.

You can now safely open the Process Chamber door and perform the needed task.

Restarting a Paused Build

The following steps describe how to Restart a Paused build.

- 1. Close the Process Chamber door(s).
- 2. Press the "Start Build" button on the Toolbars (Figure 46).

52



Figure 46. Start Build button

The build will resume where it left off.

Stopping a Build

Sometimes it may be necessary to stop a build. In the case of a recoater blade stall, the software will probably stop the build to prevent damage to the recoater system. In either case, it may be better to correct the problem and start the build over from the beginning.

The following steps describe how to stop a build.

1. To stop a build, press the "Stop Build" button on the Toolbars (Figure 47).



Figure 47. Stop Build button

The following message box will be displayed.



Figure 48. Stop build? Message Box

(Continues on the following page)

2. Press the "Yes" button.

NOTE! The build continues until you press the "Yes" button.

> Once it is safe to do so, the computer will stop the build and display a box which reads: "Part [Job Name] build stopped".

3. Press the "OK" button.

Restarting a Stopped Build

Some stopped builds can be restarted. For example, when building multiple copies of a part. Sometimes not all of the parts have been damaged or failed to build. After stopping the build you can remove damaged or failed parts and pieces of parts from the vat and continue to build once the failed part or parts have been suppressed (refer to **Suppressing a Copy** later in this guide).

Once the part has been suppressed, the build can be restarted by pressing the **Restart Build** button on the Toolbars (Figure 49).



Figure 49. Restart Build button

54



NOTE!

If the elevator needs to be lowered to recover the recoater blade to the front of the vat before restarting the build, follow the procedures in the section on *Recovering the Recoater Blade to the front of the Vat* later in this guide. The elevator must then be repositioned back to the original position (last known good layer position) prior to pressing the Restart Build button.

To restart a part at a layer different from the shown "Restart Postion":



NOTE!

Buildstation can remain running, but it should not be building a part.

1. To restart a stopped build when the last good layer of the part is known, double-click the "BuildLog.txt" file located in the "Winsla5\Output directory (Figure 50), to view the BuildLog.txt file.



Figure 50. Winsla5\Output\BuildLog Window

(Continues on the following page ...)

- 2. Go to the last "Build.Start" record in the log file and write down the job number (the job number is just to the left of the BFF file name).
- 3. From Windows NT, select "Start button\<u>R</u>un..." to open the "Run" dialog box.
- 4. Type "RegEdt32".
- 5. Press the "OK" button to open the "Registry Editor" main window.
- 6. From the "Registry Editor" main window, select the "HKEY_LOCAL_MACHINE_ on Local Machine" window from the windows.
- 7. Select the "Software" file.
- 8. Select the "3D Systems" file.
- 9. Select the "Operations" file.
- 10. Double-click "Job Number".
- 11. Enter the job number that you wrote down in Step 2.
- 12. Press the "OK" button.
- 13. Double-click "Job Layer".
- 14. Enter the desired layer number.
- **15.** Press the "OK" button.
- **16. Exit the "Registry Editor" window.**
- 17. From Buildstation, select the job that you want to restart.

Make sure the restart layer is the desired start layer. If not, select a different job then reselect the job that you want to restart. If the restart layer does not change to the layer set in the registry, you probably have entered the wrong job number in the registry.

18. Press the "Restart Build" button (Figure 49 previously).



NEVER press the "Start Build" button when restarting a build.



NOTE!

There is no guarantee that a stopped build can be restarted and complete successfully.

Suppressing a Copy

Copies of the parts can be suppressed from the build at any time and are displayed with an overdrawn **Red X** when suppressed (see Figure 42 under **Part Copies** earlier in this guide). If you notice a problem developing, the build can be paused or stopped and the problematic copy suppressed before resuming the build to prevent further buildup of cured resin which might stall the recoater blade.

The following steps describe how to suppress a part.

- 1. Select the part in the "Part Copies" dialog box that you wish to suppress, with the left mouse button (Figure 42).
- 2. Press the "Suppress Copy" button.

The suppressed part will be marked with a red "X" (Figure 42). The part will not build.

The "Unsuppress" button restores a copy to activity if used before the build starts.



NOTE!

Unsuppress cannot restart a suppressed item once building starts.

3. Press the "OK" button (Figure 42).

Recovering the Recoater Blade to the front of the Vat

In the event of a recoater blade stall or blade crash, the recoater blade must be moved to the front of the vat. This must be done in a manner which will prevent damage to the recoater system.

The computer will stop a build once a recoater blade stall has occurred regardless of the cause. Not all recoater blade crashes will stall the blade, it depends on the severity of the blade crash. In the event of a recoater blade crash that has not stalled the blade, the operator must stop the build manually (see Step 1 below).

Once the blade has been moved, the cause for the blade stall or blade crash can be determined and corrected. The build can then be restarted from that point, if possible, or restarted from the beginning.

The following steps describe how to recover the recoater blade to the front of the vat in the event of a recoater blade stall or crash.

- 1. If the computer has stopped the build for any reason, go to "Step 2". If a recoater blade crash is occurring, stop the build immediately by pressing the "Stop Build" button on the toolbars (Figure 47) (see *Stopping a Build* earlier in this guide for complete details on stopping the build).
- 2. Once the computer indicates that the Build has been stopped successfully, it is now safe to open the Process Chamber door.
- 3. Cover the beam profilers with paper towels to prevent resin from dripping on them.
- 4. Wearing the proper protective clothing and gloves, remove all floating pieces of hardened resin, if any, from the vat and recoater blade using a pair of large tweezers or similar tool.
- 5. If the path of the recoater blade to the front of the vat is clear, you can move the recoater blade to the front by pressing the "Recoater Forward" button on the toolbars. Refer to *Buildstation Toolbar Functions* later in this guide for complete details on the toolbar buttons.



WARNING!

The path must be clear or damage to the recoater system may occur. If the path is still blocked, go to Step 6. If the path is clear and the recoater blade has been moved to the front, go to Step 8.

6. If the path of the recoater blade is still blocked by damaged parts that are still attached to the platform, you will need to lower the elevator until all parts are well below the recoater blade. To lower the elevator, use the "Motion Control" dialog box to move the elevator down a specified distance.



NOTE!

For a complete description of the "Motion Control" dialog box, see *Motion Control* under *Other Buildstation Features* later in this guide.



NOTE!

Lowering the elevator a specified distance, for example 2.00 inches, will be helpful in restarting a stopped build, because you can raise the elevator that same distance just before restarting the build. If you do not plan to restart the stopped build, you can also lower the elevator by pressing the "Elevator Down" button on the toolbar.

- 7. Repeat Step 5.
- 8. Once the recoater blade is at the front of the vat, it is now safe to restart the build from that point (after repositioning the elevator), if possible, or raise the elevator using the "Elevator Up" button, removing the part and starting the build from the beginning once the problem has been corrected.

Other Buildstation Features

The features and options listed below are also available from the Buildstation.

- Remote
- Motion Control
- Telephone
- SLA Performance Characteristics
- Field Service
- Adjust Resin Volume
- Level Resin
- Stir Resin
- Write ABRA Log
- Write Sensor Logs
- Customize
- Image frame

Remote

Remote is the utility for viewing the build status on a remote computer running Windows NT which is networked to the SLA.



NOTE!

Before using Remote, the SLA must be named on the local area network, usually at installation. The Remote software must be copied to your remote computer.

There are 3 files which must be copied to your remote computer for the **Remote** utility. These files can be located in the "WINSLA5" directory on your SLA's computer. They are:

- StatCode.DLL
- MailSlot.DLL
- Remote.EXE

These files should all be copied and placed into one directory located on your remote computer.

The following steps describe how to access and use the **Remote** utility once this has been done.

1. Double click "Remote.EXE" from the directory located on your remote computer where you placed the above 3 files.

This will open the "Remote" dialog box (Figure 51).

Remote	×
Enter a machine name	ОК
	Cancel
\\SLAname	

Figure 51. Remote Dialog Box

- 2. Type in the following: "\\SLAname" inside the text box under "Enter a machine Name" (where "SLAname" is the name of the SLA to be accessed remotely).
- 3. Press the "OK" button.

The **Remote [SLAname,x%]** dialog box (Figure 52) displays essential machine and build status information vital to monitoring SLA activity from a remote computer. The title bar shows the machine name and build percentage complete.

(Continues on the following page...)

💖 Remote (SLA Machine Name)	_ 🗆 ×
Options	
Machine Status :	
Job name :	
BFF file :	
Action :	
Job Status :	
Start Time :	
End Time :	
Start Layer:	
On Layer:	
End Layer:	
Power:	

Figure 52. Remote [SLAname] Dialog Box



NOTE!

To allow for your remote computer to monitor the SLA build, check the "Enable Network Broadcasting" check box from the "Customize" dialog box. Refer to *Customize* later in this guide for information.
Motion Control

The **Motion Control** dialog boxes (Figures 55, 56, and 57) allows you to manually move the Elevator, Vat and Recoater motors at various speeds and distances. The **Motion Control** dialog boxes also allows you to monitor the status of each of the axis positions, monitor the resin level, adjust the resin level and set the build start position.



To access the Motion Control dialog boxes:

1. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 53).

<u>S</u> etup	Window Help
<u>M</u> otio	n Control
Choo	se <u>R</u> esin
Choo	se G <u>e</u> ometric Calibration File
<u>T</u> hern	nostat
<u>G</u> o to	Elevator Start Position
<u>A</u> djus	t Resin Volume
Level	Resin
St <u>i</u> r R	esin
Telep	hone
SLA <u>[</u>	⊇erformance Characteristics
Laser	'Power Limits
Field	Service
Write	A <u>B</u> RA Log
<u>W</u> rite	Sensor Logs
<u>C</u> usto	omize

Figure 53. Setup Motion Control Pull Down Menu

2. Click "Motion Control..." from the "Setup" pull-down menu to open the "Motion Control" dialog box (Figure 55).

NOTE! You can also open the "Motion Control" dialog boxes by pressing the "Motion Control" dialog button located on the toolbars (Figure 54).

•	

Figure 54. Motion Control dialog button

To move an axis a desired distance:

1. Select the radio button next to its name.

The appropriate dialog box will appear.

2. Type in the desired values in the "Acceleration (Acc.)", "Velocity (Vel.)", and "Distance (Dist.)" text boxes.



NOTE!

The Acceleration (Acc.), Velocity (Vel.) and Distance (Dist.) all have default values that can be changed by you as needed as long as you stay within the allowable ranges. Changing any of the Motion Parameters will not affect part building. They are only used for manually moving the motors at various speeds and distances.



NOTE!

When moving the "Elevator" and "Vat" down or the "Recoater" forward, you must select the (+/- button) (plus/ minus button) next to the "Distance". text box or type in a minus sign before the first numeral.

3. Press the "Move" button.

The movement will stop when the distance is reached or if the axis reaches its limit.

If you need to stop the axis movement early, press the "Stop" button or press the "Spacebar".

For making general axis movements:

1. Press and hold the "Up" or "Down" buttons for the "Elevator" and "Vat" or the "Forward" or "Backward" buttons for the "Recoater".

To send any axis to its **Home** position:

1. Press the "Home" button

To send the elevator to its **Top** position:

1. Press the "Top" button

Motion Control also allows you to manually adjust the resin volume by pressing the **Adjust Resin** button and to level the resin prior to part building by pressing the **Level to 0.0### Gap** button (Figure 56).



NOTE!

When you exit "Motion Control", all Motion parameters return to their default values.

Motion Contr	ol		×
Axis © Elevator	Position 0.0000R	-Sensor- HOME	Limits TOP BOTTOM
⊂ <u>∨</u> at	0.00000R		TOP BOTTOM
C <u>R</u> ecoater	0.0R		FRONT BACK
Elevator Movem	vel. 0.100	0 Dist	. 1.0000 +/-
0.050 - 1.00	0.001 -	0.100 -3	6.000 - 36.000
		<u>M</u> ove	<u>S</u> top
Up Top	Home	Go To Star	t Set Start Pos
Down			Start Pos = 0.0000
Resin Level)00 тос) HIGH	
134			
134			

Figure 55. Motion Control Dialog Box with Elevator Selected

Motion Control			×
Axis ○ Elevator ○ Vat ○ Recoater	Position 0.0000R 0.00000R -7.6R	Sensor- HOME	Limits TOP BOTTOM TOP BOTTOM FRONT BACK
Vat Movement- Acc. 0.0200 0.010 - 0.029	Vel. 0.020 5 0.005 -	0 Dist 0.025 <u>M</u> ove	-3.600 - 3.600
Up H Down	Home Adjust I	Resin Le	vel to 0.0040 Gap
Resin Level Diff/Sum = 0.01 111 109	12 TOC) HIGH	

Figure 56. Motion Control Dialog Box with Vat Selected

(Continued from	preceeding	page)
(P. C.	r

Axis C <u>E</u> levator C <u>V</u> at Recoater	Position 0.0000R 0.00000R -7.6R	Sensor- HOME	Limits TOP BOTTOM TOP BOTTOM FRONT BACK
Recoater Move	ment	0 Dist	15.8500 +/-
0.100 - 33.000	0.100 -	7.500 -1	5.850 - 15.850
		<u>M</u> ove	<u>S</u> top
Backward	Home	E Fa	ault Detection
Forward			
Resin Level Diff/Sum = 0.01	25 TOC) HIGH	
112			
109			

Figure 57. Motion Control Dialog Box with Recoater Selected

Telephone

The **Telephone** dialog box (Figure 60) allows you to enter numbers that will allow you to be notified by telephone or pager when a build has either failed or completed. You can program contact numbers for voice, pager or other telephone notification (for example, a distinct number for either a 'job complete' or 'job interrupt' occurrence). You can be telephoned or paged by the SLA at one number or code if the build has failed and at another number or code when the job has competed.

To access the Telephone dialog box:

1. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 58).



Figure 58. Setup Telephone Pull Down Menu

2. Click "<u>T</u>elephone..." from the "Setup" pull-down menu to open the "Telephone" dialog (Figure 60).

NOTE! You can also open the "Telephone" dialog box by clicking the "Telephone" button located on the toolbars (Figure 59).



Figure 59. Telephone button

To be notified In case of Failed Build:

1. Enter the telephone or pager numbers of all who will be dialed in succession in the text boxes under In case of Failed Build.

It may be necessary to insert commas for a 2-second pause, for example, "9,1,334,443-2343". The commas permit the dial tone to return before dialing continues.

To enable the telephone number field:

- 1. Check the box next to "Send Notification to:"
- To **Test** the dialing function:
 - 1. Press the "Test" button.
- To be notified Upon Successful Completion of Build:
 - 1. Repeat the above steps.

Telephone	x
In Case of a Failed Build	
Send Notification to:	
0	Test
0	Test
0	Test
Upon Successful Completion of Build Send Notification to	Test Test
Retries	1001
Number of pages 3 Time between pages 45	seconds
ОК Са	ancel

Figure 60. Telephone Dialog Box

Setting Telephone Paging for Buildstation 5.0 with Windows NT 4.0

The Telephone paging option in Buildstation 4.0 with Windows NT 4.0 uses Remote Access Service (RAS) to dial out and Dial-Up Networking (DUN).

To set Remote Access Service:

- 1. Press the "Start" button.
- 2. Select Settings then select "Control Panel".
- 3. Select "Network" and choose the "Services" tab.
- 4. Highlight "Remote Access Service" and press the "Properties" button.
- 5. If no modem is shown, use "Add" to identify your modem.

If a different modem is shown, you must "Remove" it before using "Add" to identify your modem.

If the correct modem you are using is shown, press the "Configure" button and select "Dial out only".

- 6. Press "OK" to close the Configure Port Usage window.
- 7. Press "Continue" to close Remote Access Setup window.
- 8. Press "Close" to exit Network window.

You will be prompted to shut down and restart computer.

9. Press "Yes".

To set Dial-Up Networking:

- 1. Select "My Computer".
- 2. Select "Dial-Up Networking".

If there are no previous entries, a dialog box will appear stating "The phonebook is empty", press OK. (If there are previous entries, press the "New" button and proceed).

- 3. Type "WINSLA" to name the new phonebook entry then press "Next".
- 4. Nothing in the Server window should be selected, press "Next".
- 5. Enter a local phone or pager number then press "Next".
- 6. Press "Finish".
- 7. Test the RAS by pressing the "Dial" button.

SLA Performance Characteristics

SLA Performance Characteristics dialog box (Figure 62) will make an overall performance record output file of the latest performance characteristics. This record can be used to determine estimated build times on future builds by loading the latest performance characteristics into a job on a desktop computer and running a build preview. This record can also be useful in determining how well the machine is running overall, and will be useful in determining when maintenance may be needed.

To access the SLA Performance Characteristics dialog box:

1. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 61).

<u>S</u> etup	<u>W</u> indow <u>H</u> elp
<u>M</u> otic	on Control
Choo Choo <u>T</u> herr	se <u>R</u> esin se G <u>e</u> ometric Calibration File nostat
<u>G</u> o to <u>A</u> djus Level St <u>i</u> r R	Elevator Start Position st Resin Volume Resin ?esin
Telep	hone
SLA	Performance Characteristics
Lase Field	r Power Limits Service
Write <u>W</u> rite	A <u>B</u> RA Log Sensor Logs
<u>C</u> usto	omize

Figure 61. Setup SLA Performance Characteristics Menu

2. Click "SLA <u>Performance Characteristics...</u>" from the "Setup" pull-down menu to open the "SLA Performance Characteristics" dialog box (Figure 62).

SLA Performance Cl	haracter	istics	
- Beam Characteristics			·
Maximum Laser Power	200	mW	ОК
Peak Sum Ratio 🛛	0.1500		Canaal
Beam Width 🛛	10.00	mils	
Build Initialization			
Build Start Overhead	0.000	seconds	
Leveler Calibration	0.000	seconds	Load
– Start Layer (Profiling, Set p	ower, etc.)		
Average Time	0.000	seconds (1 samples)	Save As
- Resin Leveling			
Average Time	0.000	seconds	
Large Spot			
Average Change Time	0.000	seconds	
Average Profile Time	0.000	seconds	
Peak Sum Ratio	0.050		
Beam Width 🛛	30.00	mils	

Figure 62. SLA Performance Characteristics Dialog Box

3. Press the "Save As..." button.

The "Save As" window opens that allows you to save and rename the latest performance characteristics file.

4. Select the location where you wish to save the latest performance characteristics file.

For example, you can save the file to your SLAs "Winsla\Output" directory, a floppy disk or some where on the network.

5. Press the "Save" button.

- 6. From a desktop workstation running Buildstation, select the build job that you wish to preview.
- 7. Open the "SLA Performance Characteristics" dialog box as you did in steps 1 and 2.
- 8. Press the "Load..." button.
- 9. Select the location where you put the latest performance characteristics output file.
- 10. Select the latest performance characteristics output file.
- 11. Press the "Open" button.

This will load the latest performance characteristics to the job that you wish to preview and will give you a build time estimation based on those characteristics.



Laser Power Limits

The **Laser Power Limits Setup** menu item is to be used only by qualified 3D Systems Field Service Engineers.

Field Service

The **Field Service** dialog box (Figure 64) is used to manually turn the laser ON and OFF and to view the status of the laser.

To access the Field Service dialog box:

1. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 63).

<u>S</u> etup	<u>W</u> indow <u>H</u> elp
<u>M</u> otion	i Control
Choos Choos <u>T</u> herm	e <u>R</u> esin e G <u>e</u> ometric Calibration File ostat
<u>G</u> o to f <u>A</u> djust Level F St <u>i</u> r Re	Elevator Start Position Resin Volume Resin esin
Teleph	ione
SLA <u>P</u> Laser I Field S	erformance Characteristics Power Limits Service
) A luit -	
<u>W</u> rite \$	ч <u>ы</u> ка Log Sensor Logs
<u>C</u> ustor	nize

Figure 63. Setup Field Service Pull Down Menu

2. Click "Field Service..." from the "Setup" pull-down menu to open the "Field Service" dialog box (Figure 64).

Field Service	×
Laser Laser On Power 300 + Position Shutter Closed Vat Pwr AOM On (Dim) Vat Pwr Define 2 1	Pinholes & Profiling Find View Init DSP
Min Laser Power: 50 Max Laser Power: 825 Max Current: 40.0	
Sensor1 Avg: 312.7 (6.13V) Max:314 Min: 312 Delta:2 (0.04V)	
X:0.0 Y:0.0 Pos Arrows move 300 counts; +,- change speed	
Chamber Controller Rev. 0.0	
Erase	Permit

Figure 64. Field Service Dialog Box

To turn the laser **ON**:

1. Click the "Laser On" check box. A check mark will appear in the box and the laser will come on.



You can view the laser status in the upper scrollable window.

To adjust the laser power (mW):

1. Press the "Up" or "Down" arrow buttons next to the "Power" text box.

To turn the laser OFF:

1. Click the check mark in the "Laser On" check box.

You can view the Laser Status in the upper scrollable window.

Field Service... is also used by 3D Field Service Personnel to perform a variety of laser beam calibrations and tests including Geometric Calibration and locating the Beam Profilers with the laser beam.

Adjust Resin Volume

Adjust Resin Volume, when selected, will determine if resin needs to be added or removed from the vat. You will be prompted to add or remove resin if required. The SLA 350, SLA 3500, SLA 5000 and SLA 7000 will add resin to the vat (refer to the *SLA Hardware Reference Manual* for additional information). The SLA 500 requires you to manually add resin. When completed, the system levels the resin.

To adjust the resin volume:

1. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 65).

<u>Setup</u> <u>W</u> indow <u>H</u> elp
Motion Control
Choose <u>R</u> esin Choose G <u>e</u> ometric Calibration File <u>T</u> hermostat
Go to Elevator Start Position
Adjust Resin Volume
Level Resin
St <u>i</u> r Resin
Tele <u>p</u> hone
SLA Performance Characteristics
Laser Power Limits
Field Service
Write A <u>B</u> RA Log
<u>W</u> rite Sensor Logs
<u>C</u> ustomize

Figure 65. Setup Adjust Resin Volume Pull Down Menu

2. Click "<u>A</u>djust Resin Volume" from the "Setup" pull-down menu to adjust the resin volume.



The following warning box (Figure 66) will appear if the elevator build platform and platform support is not submerged into the resin when attempting to adjust the resin volume. If resin is added to the vat when the build platform is too high, resin may be displaced when the build platform is lowered, resulting in a resin spill. You have the option to continue to adjust the resin volume by pressing the "OK" button, or to cancel by pressing the "Cancel" button.

The recommended procedure is to position the elevator and platform at the "Elevator Home" position or at the "Elevator to Start Position" first and then adjust the resin volume. This will prevent over filling the vat with resin.



Figure 66. Adding Resin Warning Box



NOTE!

You can also adjust the resin volume by pressing the "Adjust Resin Volume" button located on the toolbars (Figure 67).



Figure 67. Adjust Resin Volume button

Level Resin

Level Resin sets the resin to the appropriate system blade gap setting.

To level the resin:

1. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 68).

<u>S</u> etup	<u>W</u> indow <u>H</u> elp
<u>M</u> otio	n Control
Choos Choos <u>T</u> herm	se <u>R</u> esin se G <u>e</u> ometric Calibration File nostat
<u>G</u> o to <u>A</u> djust	Elevator Start Position t Resin Volume
<u>L</u> evel	Resin
St <u>i</u> r Resin	
Tele <u>p</u>	hone
SLA <u>P</u> erformance Characteristics Laser Power Limits Field Service	
Write <u>W</u> rite	A <u>B</u> RA Log Sensor Logs
Custo	mize

Figure 68. Setup Level Resin Pull Down Menu

2. Click "Level Resin" from the "Setup" pull-down menu to level the resin.



NOTE!

You can also level the resin by pressing the "Level Resin" button located on the toolbars (Figure 69).



Figure 69. Level Resin button

Stir Resin

The **Stir Resin** dialog box (Figure 71) allows you to stir the resin by moving the elevator up and down throughout the resin to allow the resin in the vat to be a homogeneous mixture which will provide more uniform build characteristics. Stirring may be particularly good for those who build large parts and may add a lot of resin at a single time. Stirring may not be good for those users whose vats are not well maintained. The recommended stir time is 20 minutes or more for all SLAs.

To access the Stir Resin dialog box:

1. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 70).

(Continued from	n preceeding page)
Communea from	precedung page)

<u>Setup</u> <u>W</u> indow <u>H</u> elp
Motion Control
Choose <u>R</u> esin Choose G <u>e</u> ometric Calibration File <u>T</u> hermostat
Go to Elevator Start Position
<u>A</u> djust Resin Volume
Level Resin
St <u>i</u> r Resin
Telephone
SLA Performance Characteristics
Laser Power Limits
Field Service
Write A <u>B</u> RA Log
<u>W</u> rite Sensor Logs
<u>C</u> ustomize

Figure 70. Setup Stir Resin Pull Down Menu

2. Click "Stir Resin..." from the "Setup" pull-down menu to open the "Stir Resin" dialog box (Figure 71).

Stir Resin			×
🔽 Timer	20	minutes	Stir Cancel

Figure 71. Stir Resin Dialog Box

To stir the resin:

- 1. Type in the desired time in the minutes text box.
- 2. Click the "Timer" box and place a check mark in it or the resin will continue to be stirred until stopped by the user.
- 3. Press the "Stir" button.

Write ABRA Log

Write ABRA Log from the Setup pull-down menu (Figure 72) toggles the function ON or OFF, with a check mark denoting the ON condition. The ABRA Log is a diagnostic log for use by the user and 3D Field Service Personnel that tracks and records laser draw speeds and laser power during part building.



To activate or deactivate the function:

1. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 72).



Figure 72. Setup Write ABRA Log Pull Down Menu

2. Click "Write ABRA Log" from the "Setup" pull-down menu.

Write Sensor Logs

Write Sensor Logs from the Setup pull-down menu (Figure 73) toggles the function ON or OFF, with a check mark denoting the ON condition. The Write Sensor Logs is a diagnostic log for use by the user and 3D Field Service Personnel that tracks laser beam positioning and power for each sensor.



The "Write Sensor Logs" files are placed in the "Winsla\Output" directory.

1. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 73).

<u>S</u> etup	<u>W</u> indow <u>H</u> elp	
<u>M</u> otic	on Control	
Choc Choc <u>T</u> herr	ose <u>R</u> esin ose G <u>e</u> ometric Calibration File nostat	
<u>G</u> o to <u>A</u> djus Leve St <u>i</u> r F	<u>G</u> o to Elevator Start Position <u>A</u> djust Resin Volume Level Resin St <u>i</u> r Resin	
Teleg	ohone	
SLA Lase Field	<u>P</u> erformance Characteristics r Power Limits Service	
 VVrite 	A <u>B</u> RA Log	
✓ Write	Sensor Logs	
<u>C</u> usto	omize	

Figure 73. Setup Write Sensor Logs Pull Down Menu

2. Click "<u>W</u>rite Sensor Logs" from the "Setup" pull-down menu.

Customize

The **Customize** dialog box (Figure 75) is used to define specific methods for positioning parts on the platform for a build or preview, to see whether new jobs inherit parameters of previous jobs, to Enable Network Broadcasting and to allow Advanced Build options.

To access the Customize dialog box:

1. From the Buildstation main window, click "Setup" on the main menu bar to open the "Setup" pull-down menu (Figure 74).

<u>Setup</u> <u>W</u> indow <u>H</u> elp
Motion Control
Choose <u>R</u> esin Choose G <u>e</u> ometric Calibration File <u>T</u> hermostat
<u>G</u> o to Elevator Start Position <u>A</u> djust Resin Volume <u>L</u> evel Resin St <u>i</u> r Resin
Telephone
SLA <u>P</u> erformance Characteristics Laser Power Limits Field Service
 ✓ Write A<u>B</u>RA Log ✓ <u>W</u>rite Sensor Logs
<u>C</u> ustomize

Figure 74. Setup Customize Pull Down Menu

2. Click "<u>C</u>ustomize..." from the "Setup" pull-down menu.

Customize	×
Part Position ✓ Strict part positioning. Automatic Copy Placement ✓ No auto position of parts under blade shadow ✓ Prefer Rows C Square Layout	OK Cancel
On New Jobs Duplicate all Build Job Parameters. If this option is not selected, number of copies, separation and restartz will be set to their default values. Parts will always be repositioned.	
Network Enable Network Broadcasting	
Build Options Advanced Build Options All Advanced Build Options are disabled If this option is not selected.	

Figure 75. Customize Dialog Box

Select the following options as desired.

Part Position

Strict part positioning, when checked, allows nesting of parts whose extents only allow a limited number of copies on the platform.

Automatic Copy Placement

No auto positioning of parts under blade shadow when checked, prevents parts from being placed in the blade shadow.

Prefer Rows radio button arranges copies in a straight line (row) until the edge of the build area is reached. When more copies are requested than will fit on a line, a second line is started. This is to take the greatest advantage of SmartSweep.

Square Layout radio button arranges copies toward the center of the platform in an approximately square area.

On New Jobs

Duplicate all Build Job Parameters when checked, causes new jobs to inherit the parameters and parts' placement of the previous build. The included note says: "If this option is not selected, number of copies, separation and restartz will be set to their default values. Parts will always be repositioned."

Network

Enable Network Broadcasting when checked, permits a remote computer to monitor the build.

Build Options

Build Options when checked, allows you access to all of the build job option check boxes located in the Build Job Options frame. The included note says: "All Advanced Build Options are disabled if this option is not selected."

The Advanced Build Options are not designed for use in a production environment.

Image frame

You can set up the **Image frame** (Figure 76) to show build images in various views of the object(s) being built during both build previews and actual builds. With the <u>right mouse button</u>, click anywhere in the Image frame to see the **"Zoom/Setup"** menu (Figure 77).



Figure 76. Image Frame Showing Views

Sizable Build Status and Image frames

The size of the frames for Build Status and Image may be changed to suit your preference at any time during setup or build procedures using two different methods:

To Resize a frame:

Maximize the Build Status and Image frames by "double-clicking" inside the frame. To return to normal, "double-click" again. Or, place the mouse pointer on the left-edge (or top-edge) of the Image frame. When the mouse pointer changes into two lines with action arrows, click and drag the mouse to resize the frame.

Scroll Bars

There are Scroll Bars located along the bottom of the Build Status frame and along the bottom of the Image frame. There is also a Scroll Bar along the right side of the Image frame. They can be identified by their little arrows at each end. Clicking on the little scroll arrows will cause the frames to scroll either horizontally or vertically to view the sections of the frames that are hidden in the Buildstation window.

Viewing the Image

The **Zoom** in and **Zoom** out menu selections (Figure 77) magnify or reduce the "build part(s)" Image size. Note that zooming action depends on where you click with the <u>right mouse button</u>. If you click on the view, only that view is zoomed. If you click away from all views but in the Image frame, all views will be zoomed.



Figure 77. Image Setup and Zoom Window

Selecting **Setup** from the menu (Figure 77) opens the **View Setup** dialog box (Figure 78 shows default settings).

View Setup			
Maximum Bitma Size	ap 200	[OK
- Top View	_Side ViewX-	_Side View Y-	Layer View
🗹 Enabled	🗹 Enabled	🔽 Enabled	💌 Enabled
✓ Visible	✓ Visible	🔽 Visible	🔽 Visible
🔽 Title	🔽 Title	🔽 Title	🔽 Title
🔽 Vert. Dim.	🔽 Vert. Dim.	🔽 Vert. Dim.	🔽 Vert. Dim.
🗹 Hor. Dim.	🗹 Hor. Dim.	🗹 Hor. Dim.	🗹 Hor. Dim.
🔽 Border	💌 Border	🔽 Border	💌 Border
🔽 Fill	🔽 Fill	🔽 Fill	🔽 Fill
🔽 Hatch	🔽 Hatch	✓ Hatch	🔽 Hatch
	Progress	Progress	

Figure 78. View Setup Dialog Box

You can select views from the **View Setup** dialog box (Figure 78). These selections can be made either before or during a build or preview. To display, the views must be both **Enabled** and **Visible**.

Maximum Bitmap Size

View Setup allows you to view the bitmap in various axes and sizes, offering choices in integers from 30 to 1000. The choices must be selected before a build or preview is started.

Enabled

Selecting this makes the software track particular views throughout the build.

Visible

This selection displays the view in the **Image** area.

Title

This displays the view title and allows you to easily differentiate between Top / Layer and Side X / Side Y views.

Ver. Dim

This displays the vertical, or Z-axis, dimension of the object(s) being built in the view selected.

Hor. Dim

This displays the horizontal, or X and Y-axes, dimensions of the object(s) being built in the view.

Border

This displays the border vectors of the object(s) being built in the view.

Fill

This displays the fill vectors of the object(s) being built in the view.

Hatch

This displays the hatch vectors of the object(s) being built in the view.

Progress

This displays an overall Z-axis dimension similar to Ver. Dim on the Side X View and Side Y Views, but also indicates the build progress layer by layer with an asterisk on the dimension line.



NOTE!

Displaying views can cause a build to slow down. For the fastest possible build times, it is recommended that these views be disabled when not in use, e.g. when the operator is not at the machine. The views can be set up, and then disabled when not being used.

To resize all views, click in the Image area away from the views with the right mouse button again and select **Zoom in** or **Zoom out**.

To apply resizing options to a single view only, click the right mouse button directly on an image. The floating menu appears with **Hide**, which makes a single view disappear (recover by pressing the **OK** button in the **View Setup** dialog box).

Buildstation Toolbar Functions



Figure 79. The Toolbars

The **Toolbars** (Figure 79) have several control buttons divided among five toolbars. Each toolbar is moveable and lockable so that a user can position them anywhere on the screen. The machine functions are activated by a single click of the left mouse button on the associated Toolbar button. *Refer to the section View (Toolbars) later in this guide on how to access the Tool bars*.

Build Toolbar

The "Build" Toolbar buttons are:



Start Build, Pause Build, Stop Build, Restart Build and Preview Build.



The "Start" and "Restart" buttons are only enabled if both Process Chamber doors are closed and all panels securely in place. An "X" over the icon indicates open interlocks.

- The **Start Build** button begins a build or resumes the build after a paused build. Refer to the section **Starting the Build** located under *Essential Concepts: Steps to Prepare and Start the Build* described earlier in this guide for complete details.
- The **Pause Build** button pauses the build. Refer to section **Pausing**, **Stopping and Restarting a Build** located under *Advanced Part Building Techniques* described earlier in this guide for complete details.
- The Stop Build button stops a build. Refer to section Pausing, Stopping and Restarting a Build located under Advanced Part Building Techniques described earlier in this guide for complete details.
- The Restart Build button restarts stopped builds. There is no guarantee that a restarted build will complete successfully. Refer to section Pausing, Stopping and Restarting a Build located under Advanced Part Building Techniques described earlier in this guide for complete details.
- The Preview Build button runs a preview of the build. This shows a layer by layer representation of the build without invoking hardware functions. The preview is displayed in the Image frame section of the build window.

Main Motion Toolbar

The "Main Motion" Toolbar buttons are:



Recoater Forward, Recoater Backward, Elevator Up, Elevator Down, Elevator Home, Elevator to Start Position, Platform to Top, Adjust Resin Volume, and Level Resin.

The motion controls for the **Recoater** and **Elevator** buttons (the first four of this group) are "**momentary contact**" only. This means that motion is activated by pointing to the icon and holding down the left mouse button; motion ceases at mouse button release.



NOTE!

The "Elevator" and "Recoater" buttons will only be enabled when it is safe to move them to prevent a collision between the Elevator and Recoater. An "X" over the icon indicates open interlocks.

- The **Recoater Forward** button moves the recoater blade forward.
- The **Recoater Backward** button moves the recoater blade backward.
- The Elevator Up button moves the elevator up.
- The Elevator Down button moves the elevator down.
- The Elevator Home button moves the elevator to its home position.
- The Elevator to Start Position button repositions the elevator to the last saved elevator start position.
- The Platform to Top button moves the elevator to its top position.

- The Adjust Resin Volume button allows you to adjust the resin volume and prompts you to add or remove resin in the SLA if required. Refer to the section Adjust Resin Volume located under *Other Buildstation Features* described earlier in this guide for complete details.
- The Level Resin button sets the resin to the appropriate system blade gap level. Refer to the section Level Resin located under *Other Buildstation Features* described earlier in this guide for complete details.

Other Motion Toolbar

The "Other Motion" Toolbar buttons are:



Vat Up, Vat Down, Vat Home, and Recoater Home.

- The Vat Up button moves the vat up.
- The Vat Down button moves the vat down.
- The **Vat Home** button moves the vat to its home position which is just below the vat's upper limit.
- The **Recoater Home** button moves the recoater blade to its home position which is at the recoater blade's front limit switch (front of the vat).



An "X" over the icon indicates open interlocks.

Telephone Toolbar

The "Telephone Setup" Toolbar button is:



Telephone Setup button

• The **Telephone Setup** button opens the Telephone dialog box which allows you to enter telephone or pager numbers that allows you to be notified by telephone or pager when a build has either failed or completed. Refer to the section **Telephone** located under *Other Buildstation Features* described earlier in this guide for complete details.

Motion Control Toolbar

The "Motion Control Dialog" Toolbar button is:



Motion Control Dialog button

• The Motion Control Dialog button opens the Motion Control dialog box. Refer to the section Motion Control located under Other Buildstation Features described earlier in this guide for complete details.

Buildstation Main Menu Functions

<u>File</u>

Opens the **<u>File</u>** pull-down menu.



Figure 80. The File pull-down menu

New Build Window

Selecting this option opens a new build window. Only one part, or set of parts, can built at a time, but this will allow you to preview other builds at the same time a current build is running on the SLA.

<u>C</u>lose Build Window

Selecting this option closes the active build window. For example, after running a preview, you can close that window to view the current job running on the SLA.

Print Build Settings

Allows you to print the window if the controller is linked to a networked printer.

Print Preview

Displays a preview of the Build Settings that would be printed by **Print Build Settings**. If there is no printer attached locally or via the network, a **No Printer** dialog box appears.

Print Setup

Allows you to set printer options. If no printer is attached locally or via the network, a **No Printer** dialog box appears.

E<u>x</u>it

Shuts down the Buildstation Software.

Edit

Opens the **Edit** pull-down menu.



Figure 81. The Edit pull-down menu

<u>U</u>ndo

Reverses a prior action.

Cu<u>t</u>

Removes whatever is highlighted from a line of text. The removed text goes into the Windows NT's clipboard and can be pasted into another application.

<u>С</u>ору

Copies highlighted text to the clipboard.

<u>P</u>aste

Places clipboard text at the cursor point.
View (Toolbars)

Opens the **View** pull-down menu.



Figure 82. The View Toolbars pull-down menu

Toolbars

Displays a submenu, which allows you to display or hide the **3D Systems Logo**, **Build**, **Motion Control Dialog**, **Main Motion**, **Other Motion**, and **Telephone** toolbars and buttons. A check mark on the menu item indicates that the item is visible on the screen. Clicking on any of the menu items will display or remove the check mark and corresponding **toolbar**, **logo** or **button**.

<u>L</u>ogo

Allows you to display or hide the 3D Logo on the toolbar.

<u>B</u>uild

Allows you to display or hide the Build toolbar buttons.

Motion Control Dialog

Allows you to display or hide the Motion Control Dialog toolbar button.

Main Motion

Allows you to display or hide the Main Motion toolbar buttons.

(Continues on the following page...)

(Continued from preceeding page...)

Other Motion

Allows you to display or hide the **Other Motion** toolbar buttons.

<u>T</u>elephone

Allows you to display or hide the Telephone Setup toolbar button.

View (Status Bar)

Opens the <u>View</u> pull-down menu.



Figure 83. The View Status Bar pull-down menu

<u>Status Bar</u>

Allows you to display or hide the **Status Bar**. A check mark on the menu indicates that the **Status Bar** is visible at the bottom of the screen.

Build

Opens the **Build** pull-down menu.



Figure 84. The Build pull-down menu



New Build Window

Selecting this option opens a new build window. Only one part, or set of parts, can built at a time, but this will allow you to preview other builds at the same time a current build is running on the SLA.

Build Part

Begins a build or resumes the build after a paused build. Refer to the section **Starting the Build** located under *Essential Concepts: Steps to Prepare and Start the Build* described earlier in this guide for complete details.

Delayed Build

Opens the **Delayed Build** dialog box which allows you to enter and confirm a desired date and time in which you want a build to start.

(Continues on the following page ...)

(Continued from preceeding page...)

Delayed Build	×
Enter desired start time in any stan Specify date and time, or jus	dard format. t time.
Build Start Time	
Invalid Date/Time	
Course 1	Carlor
Lancel	Lonfirm

Figure 85. Delayed Build Dialog Box

Pause Build

Pauses the build. Refer to section **Pausing, Stopping and Restarting a Build** located under *Advanced Part Building Techniques* described earlier in this guide for complete details.

Stop Build

Stops a build. Refer to section **Pausing, Stopping and Restarting a Build** located under *Advanced Part Building Techniques* described earlier in this guide for complete details.

<u>Restart Build</u>

Restarts stopped builds. There is no guarantee that a restarted build will complete successfully. Refer to section **Pausing, Stopping and Restarting a Build** located under *Advanced Part Building Techniques* described earlier in this guide for complete details.

Preview Part

Runs a preview of the build. This shows a layer by layer representation of the build without invoking hardware functions. The preview is displayed in the **Image** frame section of the build window.

<u>Setup</u>

Opens the Setup pull-down menu.



NOTE!

Each of the following menu items are described in detail earlier in this Guide.

<u>S</u> etup	<u>W</u> indow <u>H</u> elp
<u>M</u> otic	n Control
Choc	se <u>R</u> esin
Choc	se G <u>e</u> ometric Calibration File
<u>T</u> herr	nostat
<u>G</u> o to	Elevator Start Position
<u>A</u> djus	t Resin Volume
Level	Resin
St <u>i</u> r R	Resin
Telep	hone
SLA	<u>P</u> erformance Characteristics
Lase	r Power Limits
Field	Service
VVrite	A <u>B</u> RA Log
<u>VV</u> rite	Sensor Logs
<u>C</u> usto	omize

Figure 86. The Setup pull-down menu

Motion Control...

Refer to the section **Motion Control** located under *Other Buildstation Features* described earlier in this guide for complete details.

Choose <u>R</u>esin

Refer to the section **Choosing a Resin File** located under *System Setup* described earlier in this guide for complete details.

(Continues on the following page...)

(Continued from preceeding page...)

Choose Geometric Calibration File

Refer to the section **Selecting a Geometric Calibration File** located under *System Setup* described earlier in this guide for complete details.

Thermostat

Refer to the section **Setting the Thermostat** located under *System Setup* described earlier in this guide for complete details.

Go to Elevator Start Position

Sends the elevator to its last saved start position.

Adjust Resin Volume

Refer to the section **Adjust Resin Volume** located under *Other Buildstation Features* described earlier in this guide for complete details.

Level resin

Refer to the section **Level Resin** located under *Other Buildstation Features* described earlier in this guide for complete details.

Stir Resin...

Refer to the section **Stir Resin** located under *Other Buildstation Features* described earlier in this guide for complete details.

Telephone...

Refer to the section **Telephone** located under *Other Buildstation Features* described earlier in this guide for complete details.

SLA Performance Characteristics...

Refer to the section **SLA Performance Characteristics** located under *Other Buildstation Features* described earlier in this guide for complete details.

Laser Power Limits...

Laser Power Limits is a utility to be used only by 3D Systems Field Service Engineers.

Field Service...

Refer to the section **Field Service** located under *Other Buildstation Features* described earlier in this guide for complete details.

Write ABRA log

Refer to the section **Write ABRA Log** located under *Other Buildstation Features* described earlier in this guide for complete details.

Write Sensor Logs

Refer to the section **Write Sensor Logs** located under *Other Buildstation Features* described earlier in this guide for complete details.

Customize...

Refer to the section **Customize** located under *Other Buildstation Features* described earlier in this guide for complete details.

Window

Opens the Window pull-down menu.



Figure 87. The Window pull-down menu

<u>C</u>ascade

Cascade allows you to display all the open windows in cascading layers (Figure 88); only the front window is active.

📅 Build1			
F 🗒 Build2			_ 🗆 🗙
🔽 🛄 Build3			_ 🗆 🗵
🗧 🗒 Build4			
Build Job Project	Build Job Parameters	BUILD STATUS	
[Save] Add Delete	Draw Speed Ceilings (in/sec)	Component: - Start Time: -	Ac
B → B New Project2	B H	Est. End Time: -	Border Sp
mmer ivew Deptrz_Hojects	Scale Factors	End Time: -	Hatch Sp
	X Y Z	Un Layer: - Geo Cal File: -	FillSp
	Z Build Range (CAD units)		
	O Some	IMAGE	<u> </u>
	Part Copies		
	Copies: Edit Copies		
Build Job Uptions	Build Platform		
E Auto Dram			
	7777777777		

Figure 88. Four cascading open Build windows

<u>T</u>ile

Tile arranges all windows on the screen so that there are no overlaps (Figure 89).

Build Job Project Build Job Parameters Build Job Project Build Job Project	
Save Add Delete	Detaul
	-
Scale Factors	
X Y Z X Y	Z
70-140-mill	
2 build hange (LAD units)	
	1
Part Copies Part Copies	
	it Conies
📅 Build3 📃 🛄 🖾 💭 Build1	
Build Job Project Build Job Parameters Build Job Project Build Job Parameters	
Save Add Delete - Dury Sport Calina in (and	Defaul
The Share Project?	-
Scale Factors Scale Factors	
X Y Z X Y	Z
70-140-mill	
2 build hange (LAD units)	
C Some	-
Part Copies Part Copies	

Figure 89. Four tiled open Build windows

<u>Arrange lcons</u> Arrange lcons in **WinSLA**. <u>H</u>elp

Opens the Help pull-down menu.



Figure 90. The Help pull-down menu

About WinSLA...

About WinSLA... opens the About Buildstation dialog box (Figure 91) which contains version number *Buildstation 5.0*, *Build ID:* date and time, and *Machine Type:* SLA xxx. This information identifies the specifics of software creation and installation.

About Bui	dstation	×
2	Buildstation 5.0 Copyright © 1998, 1999, 3D Systems, Inc.	ОК
Build Mac	HD : May 12 1999 08:57:49 hine Type : SLA 7000	

Figure 91. About Buildstation Dialog Box

Appendix A.

Using the Windows NT Operating System

Windows NT (NT) is a 32-bit operating system developed by Microsoft Corp. Being a 32 bit system means NT offers several advantages. Because of improved methods of data storage and use, more programs offering greater productivity will be developed for 32-bit systems than for the old 8 and 16-bit systems. NT is easier to use and permits more than one person to work on the same computer at the same time if they are joined together by a network. It also can run several jobs on one computer at the same time.

Start Up

When the computer is turned on its software prepares the system for operation. This is called initialization. The screen will display a message that allows the user to launch either the DOS or the NT software operating system. The system will automatically launch into the NT operating system unless the DOS operating system is selected by the user during initialization.

The Basics

The Mouse

A computer mouse is a pointing device that was first developed in the 1950's. Inside a typical mouse there are three rollers that contact the sides of a roller ball. As the mouse is moved, the different rollers report the amount of ball movement to the computer's processor.

The Basic Mouse Operations

Using NT requires learning these basic mouse operations: moving the cursor and pointer, clicking, double-clicking, click and drag and highlighting. Usually, the user will click the left mouse button. Instructions will specify those cases where the right button is to be used.



The cursor is an image that appears on the monitor screen and is always **blinking** and will move as the mouse is moved. Its primary function is to show the user where text or numbers will typed in from the keyboard. Wherever the cursor is, that is where any text or numbers typed in from the keyboard will appear. Where the cursor is positioned depends on the relative position and movement of the mouse. The computer software is programmed to interpret mouse movements and to display its interpretation on the screen. The software is designed to be straightforward. If the mouse is moved to the right, the cursor on the screen moves in a similar fashion. The speed of movement can be set on the computer's control panel.

The pointer is similar to the cursor but does not **blink**. It will usually look like an **arrow** but can take other shapes as well depending where it is being placed on a window. It will sometimes look like an hour glass when the computer is doing something and telling you to **wait**. Its primary function is for selecting and activating menu items and buttons in the windows. The pointer will turn into a cursor when placed inside a text box so that text or numbers can be typed.

To Click the mouse means to push on one of the buttons, usually the left. Often when the cursor or pointer is located on an item that appears on the screen, clicking sends a signal to the computer to perform some action related to that item. This is the most common mouse operation.

Double clicking means to click the mouse button twice in rapid succession. The speed at which the user prefers to double click can be set in the control panel.

Click and Drag means using the mouse to place the pointer on a specific place on an object you wish to move then press and hold down the mouse button and drag the mouse. After dragging the mouse, release the button. The object on the screen will move as the mouse is moved.

Highlighting means to select text. This can be done by placing the mouse cursor on the text to be selected and clicking and dragging across the text. Sometimes text can be selected by clicking or double clicking on it.

The Keyboard

The keyboard is still an important tool for communicating with the computer by typing text, entering numbers, using the up, down, right, and left arrows and using the Enter, Control, Spacebar, Backspace, Delete and Escape keys.



Keyboard Equivalents



The keyboard equivalents listed below are mainly geared toward the Buildstation 5.0 software. Although the keyboard commands will work the same way for Windows NT in general, the Menu items may be different. For information about Windows NT 4.0 in general, refer the Windows NT 4.0 manual that comes with your software.

All of the items listed on the Menu Bar and their pull-down menus can be activated directly from the keyboard without using the mouse. For example, on the Menu Bar the keyboard equivalent of Setup is, to hold down the <alt>key and press the <S> key at the same time. This will then display the Setup pull-down menu. Notice that the "S" in Setup is <u>underlined</u>.

All of the items from the Menu Bar can be activated by holding down the <alt> key and then pressing the <u>underlined</u> letter at the same time. To exit any or all menus, just press the <alt> key. Once a pull-down menu is showing, you can activate an item by moving the highlight bar to the desired item using the Up or Down arrow keys then pressing the <Enter> key.

Some items from the pull-down menus have speed keys or shortcut keys that allow you to activate an item without the menu showing. For example, from the <u>F</u>ile pull-down menu, you can open a <u>N</u>ew Build Window by holding down the <Ctrl> key and pressing the <N> key at the same time. If any item has a speed key, in the pull-down menus, it will be listed just to the right of the item such as, <u>N</u>ew Build Window Ctrl+N.

Notice that the "N" in <u>New Build Window is <u>underlined</u>, this indicates that by pressing the <N> key while that menu is showing, will also activate that function instead of clicking on it with the mouse or moving the highlight bar to it with the arrow keys and pressing <Enter>. All of the <u>underlined</u> letters in the pull-down menus will work this way. In other words, the user has several options available to perform the same functions.</u>

To move from one menu on to another on the Menu Bar, press the Right or Left arrow keys.



Icons

Icons are the little images or pictures that appear on the monitor screen symbolizing programs, directories, etc. Placing the mouse pointer on them and clicking or double-clicking will open that icons's program, directory or file.

Windows

Windows are rectangular boxes that appear on the monitor to provide or receive information. Often a user will use a window to enter data, make menu selections or click on something the window is displaying.

Many windows can be resized. When the mouse pointer is placed on the corner of a resizeable window, it changes in appearance into a two headed arrow. By holding down the left mouse button and dragging the mouse with the two headed arrow on the window's corner, the user can make the window change size (larger or smaller).

Windows have control buttons in their upper right corner. The buttons in the upper right corner are used to reduce the window to an icon on the task bar or to minimize or maximize the window or to close the window.

To move a window around on the screen that may be hiding something behind it that you want to look at, just place the mouse pointer on the Title Bar, hold down the left mouse button and drag the mouse. As the mouse is moved, the window will move with it. When the window is at its new location, release the mouse button.

Menus and Pull-Down Menus

A menu is a selection of features that a user may access. A pull-down menu is a hidden menu that appears, usually after selecting features from the Menu Bar such as, <u>File</u>, <u>E</u>dit, etc., that opens to reveal its additional options/ features when the user clicks the mouse on it.

To choose a menu item, the user places the mouse pointer on the desired selection and clicks the left mouse button.



Logging On and Off

When NT is launched, a log on screen appears. The user logs on by pressing the Control, Alt and Delete keys simultaneously. The system will then bring up a password screen. This security feature allows access only to registered users. Without a correct password, the system software will not respond. If the user types a valid password, the system then goes to the Program Manager window.

Launching Software

To launch software in NT, double click on the icon or file name of the program desired.

Introducing Windows NT

Clicking on this icon will show a brief tour of some features of NT. Some of the subjects covered include Logging On, Networking, Sharing Files, User Accounts and Using Help.

Dialog Boxes

Many of the pull-down menu items (the ones followed by three dots... or ellipsis) have dialog boxes for the user to enter information when those items are selected. Most dialog boxes allow the user to enter text and/or numbers into text boxes as needed. To enter data into a text box, you must highlight the old data by placing the cursor/pointer into the text box and doubleclicking the left mouse button then begin typing.

Dialog boxes may also contain one or more check boxes that allow the user to select or deselect certain features as needed by placing a check mark in the check box. One or more of the check boxes can be checked as needed. Some dialog boxes contain little round check buttons. These buttons are for "either/or" functions The software will only allow you to choose just one of these buttons that are grouped together. To select or deselect, place the mouse pointer in the check box or button and click the left mouse button.

Many dialog boxes contain "**push**" buttons that allow the user to activate certain features by placing the mouse pointer on that button and "**pushing**" it by clicking the left mouse button. Two of the most common buttons are the "**OK**" and "**CANCEL**" buttons. The "**OK**" button is mainly used to save any changes just made in the dialog box, while the "**CANCEL**" button will allow you to "exit" the dialog box without changing any data or settings.



To move a dialog box around on the screen that may be hiding something behind it that you want to look at, just place the mouse pointer on the Title Bar, hold down the left mouse button and drag the mouse. As the mouse is moved, the dialog box will move with it. When the dialog box is at its new location, release the mouse button.

Active Window

When the Window menu is pulled down, all open build windows will be listed at the bottom of the menu with a number corresponding to the order in which they were opened. There will be a checkmark beside the name of the active window. Only one window can be active at a time. The active window will display a colored Title Bar at the top. The software controls will work in the active window only.



Appendix B.

Error Messages

The following is an alphabetical listing of **some** of the error messages that may appear, along with an explanation of what they mean and what action to take. There are however, other error messages that can appear but are **rare** and are beyond the scope of this document. Should they occur, call 3D Plus+ at the telephone number below.

For further information call 3D Plus+ Customer Support at 1-800-793-3669 (U. S. or Canada), or call your local 3D Systems' Representative.

Error Message:	Beam not found while profiling
Cause:	Could not find laser beam.
Action:	Make sure door is not ajar. Check laser power. Make sure laser can turn on. If problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message:	Cannot find the GEO file
Cause:	GEO file does not exist.
Action:	Check the existence of the GEO file from the Setup pull-down menu under Choose Geometric Calibration File.
Error Message:	Cannot move the elevator, recoater is not at a safe position
Cause:	Recoater is not at home position while attempting to move elevator.
Action:	Move the recoater to its home position.



Error Message:	Cannot move the recoater: Elevator is in an unsafe position
Cause:	Interlocked by safe sweep zone.
Action:	Lower the elevator until it is not at home.
Error Message:	Cannot open AXIS kernel device driver
Cause:	Possible incorrect software installation.
Action:	Reboot. If problem persists, reinstall Buildstation software.
Error Message:	Cannot open DSP kernel device driver
Cause:	Possible incorrect software installation.
Action:	Reboot. If problem persists, reinstall Buildstation software.
Error Message:	Cannot open IO3D kernel device driver
Cause:	Possible incorrect software installation.
Action:	Reboot. If problem persists, reinstall Buildstation software.
Error Message:	Could not open drawing servo parameters file "params.dat"
Cause	The servo parameters file "params.dat" should be in the directory in which "Buildstation" is installed.
Action:	Reinstall Buildstation software. If problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message:	Disk IO error while profiling
Cause:	Hard disk may be full.
Action:	Delete unnecessary files. If problem persists, notify 3D Plus+ and request your Field Engineer.



Appendix 117

Buildstation Control Software User's Guide

Error Message:	DSP Command timed out
Cause:	Potential hardware problem.
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.
Error Message:	DSP firmware error
Cause:	Potential hardware problem.
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.
Error Message:	Elevator acceleration or velocity out of range.
Cause:	Bad instructions in BFF file.
Action:	Reprepare file.
Error Message:	Elevator hit bottom during dip.
Cause:	Part height beyond machine capacity.
Action:	Check maximum part height. Limit switches may need adjustment: Notify 3D Plus+ and request your Field Engineer.
Error Message:	Elevator hit bottom without finding home
Cause:	Potential hardware problem; no home switch detected.
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.
Error Message:	Error acquiring beam profiler
Cause:	System was not able to acquire profiler information.
Action:	Make sure door is not ajar. Check laser power. If problem persists, notify 3D Plus+ and request your Field Engineer.



Error Message:	Error converting laser argument data
Cause:	Potential hardware problem.
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.
Error Message:	Error discerning pinhole powers
Cause:	Profiling did not complete properly.
Action:	Make sure door is not ajar. Check laser power. If problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message:	Error finding half mil pinhole
Cause:	Profiling did not complete properly.
Action:	Make sure door is not ajar. Check laser power. If problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message:	Error finding one mil pinhole
Cause:	Profiling did not complete properly.
Action:	Make sure door is not ajar. Check laser power. If problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message:	Error in beam profile
Error Message: Cause:	Error in beam profile Profiling did not complete properly.
Error Message: Cause: Action:	Error in beam profile Profiling did not complete properly. Make sure door is not ajar. Check laser power. If problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message: Cause: Action: Error Message:	Error in beam profile Profiling did not complete properly. Make sure door is not ajar. Check laser power. If problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message: Cause: Action: Error Message: Cause:	Error in beam profile Profiling did not complete properly. Make sure door is not ajar. Check laser power. If problem persists, notify 3D Plus+ and request your Field Engineer. Error in order of profiler pinholes Profiling did not complete properly.



Error Message:	Error in profiler pinhole order
Cause:	Profiling did not complete properly.
Action:	Check laser power. If problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message:	Error in profile safety check
Cause:	Profiling did not complete properly.
Action:	Make sure door is not ajar. Check laser power. If problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message:	Error occurred while reading laser power. Build will be aborted!
Cause:	Probable cause, is the laser was unable to locate the FAD sensor.
Action:	Check that the safety shutter is open. If problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message:	Error while converting laser reply message
Cause:	Potential laser hardware problem.
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.
Error Message:	Failed to create laser control object
Cause:	Possible incorrect software installation.
Action:	Reboot. If problem persists, reinstall your Buildstation software.



Error Message:	Insufficient leveler range for preferred blade gap.
Cause:	Difference between physical and preferred blade gaps is too great.
Action:	Notify 3D Plus+ and request your Field Engineer.
Error Message:	Invalid GEO file format
Cause:	Corrupt GEO file.
Action:	Notify 3D Plus+ and request your Field Engineer for recalibration.
Error Message:	IO3D kernel device driver is already open
Cause:	Possible incorrect software installation.
Action:	Reboot. If problem persists, reinstall your Buildstation software.
Error Message:	Job name already exists. Please verify name
Error Message: Cause:	Job name already exists. Please verify name A job with the same name already exists when attempting to edit new Job's name.
Error Message: Cause: Action:	Job name already exists. Please verify name A job with the same name already exists when attempting to edit new Job's name. Check to see if there is more than one job with the same name.
Error Message: Cause: Action: Error Message:	Job name already exists. Please verify name A job with the same name already exists when attempting to edit new Job's name. Check to see if there is more than one job with the same name. Laser does not support such function
Error Message: Cause: Action: Error Message: Cause:	Job name already exists. Please verify name A job with the same name already exists when attempting to edit new Job's name. Check to see if there is more than one job with the same name. Laser does not support such function Incorrect software installation.
Error Message: Cause: Action: Error Message: Cause: Action:	Job name already exists. Please verify name A job with the same name already exists when attempting to edit new Job's name. Check to see if there is more than one job with the same name. Laser does not support such function Incorrect software installation. Reinstall with special care to choose the correct SLA type.
Error Message: Cause: Action: Error Message: Cause: Action: Error Message:	Job name already exists. Please verify name A job with the same name already exists when attempting to edit new Job's name. Check to see if there is more than one job with the same name. Laser does not support such function Incorrect software installation. Reinstall with special care to choose the correct SLA type. Laser failed to interpret command issued
Error Message: Cause: Action: Error Message: Cause: Action: Error Message: Cause:	Job name already exists. Please verify name A job with the same name already exists when attempting to edit new Job's name. Check to see if there is more than one job with the same name. Laser does not support such function Incorrect software installation. Reinstall with special care to choose the correct SLA type. Laser failed to interpret command issued Incorrect software installation.



Error Message:	Laser handshake error
Cause:	Potential laser hardware problem.
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.
Error Message:	Laser security error
Cause:	Potential laser hardware problem.
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.
Error Message:	Layer thickness out of range.
Cause:	Bad instructions in BFF file.
Action:	Reprepare file.
Error Message:	Leveler calibration band out of range.
Cause:	Difference between physical and preferred blade
	gaps is too great.
Action:	Notify 3D Plus+ and request your Field Engineer.
Action: Error Message:	Motor not initialized. Attempted to move to position without first moving the motor to its home position
Action: Error Message: Cause:	Motor not initialized. Attempted to move to position without first moving the motor to its home position An attempt was made to use the "Move To" function without first moving the motor to its home position.
Action: Error Message: Cause: Action:	 Motor not initialized. Attempted to move to position without first moving the motor to its home position An attempt was made to use the "Move To" function without first moving the motor to its home position.
Action: Error Message: Cause: Action: Error Message:	 Motor not initialized. Attempted to move to position without first moving the motor to its home position An attempt was made to use the "Move To" function without first moving the motor to its home position. Move to home position first.
Action: Error Message: Cause: Action: Error Message: Cause:	 Motor not initialized. Attempted to move to position without first moving the motor to its home position An attempt was made to use the "Move To" function without first moving the motor to its home position. Move to home position first. Move length not equal to requested length Hardware problem (PC21 Indexer).



Error Message:	No connection between PC host and DSO
Cause:	Potential hardware problem.
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.
Error Message:	Number of sweeps out of range.
Cause:	Bad instructions in BFF file.
Action:	Reprepare file.
Error Message:	PC21 Get position error
Cause:	Potential hardware problem.
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.
Error Message:	PC21 Indexer Status failure
Cause:	Potential hardware problem.
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.
Error Message:	Port selected for paging not found
Cause:	Windows NT detected that there is no selected port.
Action:	Check Windows NT configuration.
Error Message:	Reading binary file error
Cause:	Corrupt GEO file.
Action:	Notify 3D Plus+ and request your Field Engineer for recalibration.



Buildstation Control Software User's Guide

Error Message:	Recovered from sweeper stall.
Cause:	The SLA has recovered from a sweeper stall.
Action:	If the reason is unknown, check the part for signs of a blade crash and restart the build if all looks "OK", or end the build to do further investigation. If the problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message:	Resin volume adjustment failed.
Cause:	Resin Refill System empty, (SLA 350, SLA 3500, SLA 5000 & SLA 7000) or potential hardware problem (all SLAs).
Action:	Check Resin Refill container (SLA 350, SLA 3500, SLA 5000 & SLA 7000). Replace with a full container if needed. For potential hardware problems, (all SLAs) Reboot, notify 3D Plus+ and request your Field Engineer.
Error Message:	Safety Shutter time out
Error Message: Cause:	Safety Shutter time out Chamber door may be ajar.
Error Message: Cause: Action:	Safety Shutter time out Chamber door may be ajar. Make sure it is not ajar. If problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message: Cause: Action: Error Message:	Safety Shutter time out Chamber door may be ajar. Make sure it is not ajar. If problem persists, notify 3D Plus+ and request your Field Engineer. Sensor low error
Error Message: Cause: Action: Error Message: Cause:	Safety Shutter time out Chamber door may be ajar. Make sure it is not ajar. If problem persists, notify 3D Plus+ and request your Field Engineer. Sensor low error Profiler did not acquire enough power.
Error Message: Cause: Action: Error Message: Cause: Action:	Safety Shutter time out Chamber door may be ajar. Make sure it is not ajar. If problem persists, notify 3D Plus+ and request your Field Engineer. Sensor low error Profiler did not acquire enough power. Notify 3D Plus+ and request your Field Engineer.
Error Message: Cause: Action: Error Message: Cause: Action: Error Message:	Safety Shutter time out Chamber door may be ajar. Make sure it is not ajar. If problem persists, notify 3D Plus+ and request your Field Engineer. Sensor low error Profiler did not acquire enough power. Notify 3D Plus+ and request your Field Engineer. Sensor saturation detected
Error Message: Cause: Action: Error Message: Cause: Action: Error Message: Cause:	Safety Shutter time out Chamber door may be ajar. Make sure it is not ajar. If problem persists, notify 3D Plus+ and request your Field Engineer. Sensor low error Profiler did not acquire enough power. Notify 3D Plus+ and request your Field Engineer. Sensor saturation detected Profiler received too much power.



Error Message:	Sweeper failed to complete move. Check for collision with part or table
Cause:	Sweeper failed or stalled while attempting to complete move. Possible collision with part or table.
Action:	Check for collision with part or table.
Error Message:	Sweeper gap or velocity out of range
Cause:	Bad instructions in BFF file.
Action:	Reprepare file.
Error Message:	Sweeper not at home for part drain.
Cause:	Potential hardware problem.
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.
Error Message:	The calculated elevator move is out of range.
Cause:	Bad instructions in BFF file.
Action:	Reprepare file. If problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message:	The drawing servo parameters file "params.dat" is invalid
Cause:	Possible incorrect software installation.
Action:	Reboot. If problem persists, reinstall your Buildstation software.



Appendix 125

Buildstation Control Software User's Guide

Error Message:	The elevator appears to be at both limits simultaneously.
Cause:	This might be caused by an interlock condition such as the chamber door being open. Otherwise it might be a hardware problem.
Action:	Make sure the chamber door(s) are not open. If the problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message:	The recoater blade appears to be at both limits simultaneously.
Cause:	This might be caused by an interlock condition such as the chamber door being open. Otherwise it might be a hardware problem.
Action:	Make sure the chamber door(s) are not open. If the problem persists, notify 3D Plus+ and request your Field Engineer.
Error Message:	The registry value cannot be written
Error Message: Cause:	The registry value cannot be written Possible incorrect software installation.
Error Message: Cause: Action:	The registry value cannot be written Possible incorrect software installation. Reboot. If problem persists, reinstall your Buildstation software.
Error Message: Cause: Action: Error Message:	The registry value cannot be written Possible incorrect software installation. Reboot. If problem persists, reinstall your Buildstation software. There was trouble downloading the drawing servo program "SERVO.OUT" to the drawing servo system
Error Message: Cause: Action: Error Message: Cause:	The registry value cannot be written Possible incorrect software installation. Reboot. If problem persists, reinstall your Buildstation software. There was trouble downloading the drawing servo program "SERVO.OUT" to the drawing servo system Possible incorrect software installation.
Error Message: Cause: Action: Error Message: Cause: Action:	 The registry value cannot be written Possible incorrect software installation. Reboot. If problem persists, reinstall your Buildstation software. There was trouble downloading the drawing servo program "SERVO.OUT" to the drawing servo system Possible incorrect software installation. Reboot. If problem persists, reinstall your Buildstation software.
Error Message: Cause: Action: Error Message: Cause: Action: Error Message:	The registry value cannot be written Possible incorrect software installation. Reboot. If problem persists, reinstall your Buildstation software. There was trouble downloading the drawing servo program "SERVO.OUT" to the drawing servo system Possible incorrect software installation. Reboot. If problem persists, reinstall your Buildstation software. Timed out reading IDB-ready bit in PC21
Error Message: Cause: Action: Error Message: Cause: Action: Error Message: Cause:	The registry value cannot be writtenPossible incorrect software installation.Reboot. If problem persists, reinstall yourBuildstation software.There was trouble downloading the drawing servo program "SERVO.OUT" to the drawing servo systemPossible incorrect software installation.Reboot. If problem persists, reinstall your Buildstation software.Timed out reading IDB-ready bit in PC21Potential hardware problem.



Error Message:	Timed out reading ODB-ready bit	
Cause:	Potential hardware problem.	
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.	
Error Message:	Trouble reading level sensor.	
Cause:	Potential hardware problem.	
Action:	Reboot, notify 3D Plus+ and request your Field Engineer.	
Error Message:	Unrecovered sweeper stall.	
Cause:	The sweeper has stalled and not recovered.	
Action:	Move the sweeper to the front of the vat. If the reason is unknown, check the part for signs of a blade crash and restart the build if all looks "OK", or end the build to do further investigation. If the problem persists, notify 3D Plus+ and request your Field Engineer.	
Error Message:	Value out of range	
Cause:	Incorrect software installation.	
Action:	Reinstall with special care to choose the correct SLA type.	
Error Message:	Watch dog error	
Cause:	Vat jack hardware problem.	
Action:	Notify 3D Plus+ and request your Field Engineer.	



Appendix C.

Troubleshooting the Buildstation

The following problems can typically be solved using the solutions listed here. If the problem is still unresolved, call 3D Plus+ Customer Service at 1-800-793-3669 (U. S. or Canada). From outside the U. S. and Canada, call your local 3D Systems Representative.



Build

S ymptom	Cause	Solution
Cross section on Build screen is unrecognizable.	Sliced along the incorrect axis.	Reslice along the correct axis.
Supports do not attach to the platform.	Build start position is too low.	Reset build start location of platform.
	Insufficient cure depth values.	Prepare again using increased overcure amount.
	Resin added on platform where part is to be drawn.	Add resin in left rear corner of vat.
Build stops during recoating.	Autoleveling system is at limits due to temperature change.	Add or remove resin.
	Autoleveling system is inoperative.	See Hardware section.
	Heater is turned OFF.	Check the heater and resin temperature.
Resin leveling time between layers is longer than expected.	Diode leveler is out of adjutment.	Call 3D Field Service.



S ymptom	Cause	Solution
Layers are unattached and float on the resin surface	The part is incorrectly supported.	Redesign the supports.
	Trapped volume.	Decrease sweep velocity.
	Insufficient cure depth.	Prepare again with the proper overcure.
	Blade gap out of adjustment.	Call 3D Field Service.
	Power failure.	Restart build with restart option if the resin temperature is correct.
	Laser power fluctuations.	Call 3D Field Service.
	Blade gap percentage set incorrectly.	Prepare again with the correct percentage.
Laser is off and the elevator continues.	Beam obstructed.	Check the shutter.
	Laser failure.	Ensure the chamber door is closed. Turn the laser on. Call 3D Field Service.
	Recoater blade stalled by hitting the part while moving across the vat.	Prepare again with the proper recoating parameters.
Build stopped.	Disconnected or defective cables.	Connect cables and check quality of connection.
	A mechanical or electrical compoment failure.	Call 3D Field Service.



.

Network

.

S ymptom	Cause	Solution
Network will not connect.	Server not mounted.	Mount Workstation in DiskAccess or PC-NFS configuration.
	Hosts file has improper address.	Correct all computer hosts files so they match.
	Workstation password changed.	Reconfigure DiskAccess or PC-NFS.
	Entering incorrect remote computer file name.	Enter proper names.
	Buildstation powered up before Workstation.	Reboot PC after Workstation has started.
	Cables are too long.	Check length of cables add repeaters if needed.
	The network is overloaded or too busy.	Check the number of proc- esses running. Try transferring the files at a later time.
	No route path to Workstation.	Verify the network router configuration.
Files take too long to transfer.	Incomplete slice or converge file.	Reslice with adequate disk space. Check file completion of (SLI) and (BFF) files in 3D Lightyear.



.

S ymptom	Cause	Solution
Part is missing the top layers.	Bad CAD model. Intersecting parts are not Boolean.	Either Booleanize the .stl files or redesign the part checking surfaces and closing gaps. Use Tools, Verify STL.
	Workstation ran out of disk space during slicing.	Clear up some disk space and prepare the slice file again if it is incomplete.
Stray or missing vectors.	Interface limitations.	Contact your CAD vendor for interface support.
	.stl file triangles are too narrow.	Increase the slice resolution or change the CAD .stl resolution. Use Tools, Verify STL.
	Confused mirrors, incorrect movement parameters.	Reboot.
	Max Draw Speed too high.	Decrease Max Draw Speed under Build Job Parameters.
Cobwebs.	Laser missed pinholes.	Call 3D Field Service.
	Confused mirrors, incorrect movement parameters.	Reboot and call 3D Field Service.
	Recoater blade is moving the part.	Prepare again with the proper recoating parameters. Increase number of supports.
	Poor laser contrast ratio.	Call 3D Field Service.

•

Part Specific



S ymptom	Cause	Solution
Tags (tiny bumps).	Excessive mirror drift.	Call 3D Field Service.
Layers shifted.	Incorrect cure depth, improper recoating parameters.	Prepare again with the proper overcure and recoating parameters.
	Improper supports.	Redesign the support structure.
	Profiling errors	Call 3D Field Service.
Layers separated.	Improper hatch spacing and/or overcure amount.	Prepare again with the proper parameters.
	Improper skin fills.	Prepare again with the proper fill spacing.
	Low or fluctuating laser power.	Call 3D Field Service.
	Bad recoate parameters with Zephyr.	Prepare again with the proper parameters.
Flat surface is not flat.	Overcure amount is too large.	Reprepare with the proper values.
	Incorrect recoat parameters.	Prepare again with the proper parameters.
	Beam diameter too large.	Call 3D Field Service.
Part is warped.	Hatch spacing is too close, or overcure too much or too little.	Reprepare with proper values.
	Insufficient supports.	Add more support structures.
	Waited too long before post curing the part.	Post cure before part deforms due to its own weight.



S ymptom	Cause	Solution
	Part became too hot in the PCA.	Post cure with short bursts and allow cooling between exposures.
	Incorrect cleaning solvent.	Use proper solvent to minimize swelling.
Parts are too dark (yellow).	Too much UV exposure.	Heat the part in an oven set to approximately 65°C to 93°C (150°F to 200°F) for 10 to 30 minutes.
Part smells.	Part not thoroughly rinsed of solvent.	Clean the part again.
	Improper solvent used in post processing.	Refer to cleaning and post processing procedures.
Blistering on upper surface.	Incorrect fill penetration.	Increase overcure on fill.
Blistering on bottom surface.	Ballooning of first few delicate layers.	Increase Z-W ait time for first few layers of bottom surface.
	Beam diameter too small.	Call 3D Field Service.
Soft Parts.	Hatch spacing too large.	Decrease hatch spacing.
	Incorrect hatch overcure.	Consult Build-style Parameters.
	Insufficient post cure.	See part building techniques.
	Resin parameters may not be set correctly.	Run W INDOW PANES from the AccuMax TOOLKIT.
	Incorrect resin file selected.	Select proper resin file.



134 Appendix

Buildstation Control Software User's Guide


Index

А

AccuMax Peak Performance Toolkit 29 Adding a New Resin File 29 Adding Projects and Jobs 36 Adjust Resin Volume 78 Adjust Resin Volume button 95 Adjusting Parameters 45 Auto Drain 43

В

Bitmap Size 90 Border Speed 40 Build Job Options frame 17, 42 Build Job Parameters frame 19, 44 Build Job Project frame 16, 36 Build Platform 33 build Platform 23 Build Status Frame 20 Build Toolbar Pause Build button 93 Preview Build button 93 Restart Build button 93 Start Build button 93 Start Build button 93 Build-Style Parameters 46

С

Choosing a Resin File 27 Completing the Build 41 Cursor 8 Customize 85

D

Delete 30 Deleting a Resin File 30 Dial-Up Networking (DUN) 71 Draw Speed Ceilings 45

Е

Elevator Down button 94 Elevator Home button 94 Elevator Start Position 23 Elevator to Start Position button 94

F

Field Service 76 Fill Speed 40

G

Geometric Calibration File 31 H

Hatch Speed 40

Image frame 20, 88 Installing a Build Platform 33

L

Laser Power Limits 75 Launching the Buildstation 11 Level Resin 80 Level Resin button 95



136 Index

Μ

Main Menu Bar 14 Main Menu Functions 97 Build 101 Edit 98 File 97 Help 108 Setup 103 View 99 Window 106 Main Motion Toolbar 94 Adjust Resin Volume button 95 Elevator Down button 94 Elevator Home button 94 Elevator to Start Position 94 Elevator Up button 94 Level Resin button 95 Platform to Top button 94 Recoater Backward button 94 Recoater Forward button 94 Motion Control 23, 24, 33, 34, 63 Mouse 8

Ν

New Job 37 Number of Sweeps 41

Ο

Observing Build Progress 40 Other Motion Toolbar Recoater Home button 95 Vat Down button 95 Vat Home button 95 Vat Up button 95

Ρ

Part Copies 47 Add 49 Delete 49 Positioning 51 Spacing 50 Suppress Copy 51 Unsuppress button 57 Part Dimensions frame 18, 43 Pause Build button 52, 93 Pausing a Build 52 Platform to Top button 41, 94 Pointer 8 Pre Dip Delay 40 Preview Build button 93 Projects and Jobs 36

R

Recoater Backward button 94 recoater blade stall 53 recoater blade stall or blade crash 58 Recoater Forward button 94 Recoater Home button 95 Recovering the Recoater Blade to the front of the Vat 58 Remote 60 Remote Access Service (RAS) 71 Resin File 27 Add New 29 Resize a frame 88 Restart Build button 54, 93 Restarting a Paused Build 52 Restarting a Stopped Build 54



S

Scale Factors 46 Scroll Bars 89 SLA Hardware Reference Manual 33, 35 SLA Performance Characteristics 73 Start Build button 52, 93 Starting the Build 39 Status Bar 15 Stir Resin 81 Stop Build button 53, 93 Stopping a Build 53 Suppress Copy button 57 Suppressing a Copy 54, 57 Sweep Velocity 41 Symbols Used in this Guide 7 System Setup 21

Т

Telephone 69 Telephone paging 71 Dial-Up Networking (DUN) 71 Remote Access Service (RAS) 71 Thermostat 21 Title Bar 14 Toolbars 15, 92, 93 Build Toolbar 93 Main Motion Toolbar 94 Motion Control Toolbar 96 Other Motion Toolbar 96 Telephone Toolbar 96 Transferring a Buildfile 10

U

Unsuppress button 57 User Interface 13 Build Job Options frame 17 Build Job Parameters frame 19 Build Job Project frame 16 Build Status frame 20 Image frame 20 Main Menu Bar 14 Part Dimensions frame 18 Status Bar 15 Title Bar 14 Toolbars 15

V

Vat Down button95Vat Home button95Vat Up button95

W

Write ABRA Log 83 Write Sensor Logs 84

Ζ

Z Build Range (CAD units) 46 Z Dip Distance 40 Z Level Wait 41 Zoom in 89 Zoom out 89



138 Index

