



SLS[®] Systems Software Utilities Guide

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Chapter 1

Introduction

This section includes the following topics:

- [Utilities Included with the System](#)
- [Starting the Utilities](#)

Utilities Included with the System

This guide describes the following software utilities provided with the SLS system:

- Remote Notification, which can tell you when builds finish or problems occur, by pager or e-mail
- Remote Status, which checks the status of the SLS system from a remote system
- Gettimes, which summarizes important time data from a build's states.blog file
- Build Report, which extracts selected information from the build packet and the states.blog file in a spreadsheet format
- The Scale-Offset II and Runtracker workbooks, which generate and track scale and offset data
- STL Optimization utility, which reorganizes STL files so that they load and display faster

Gettimes, Build Report, Scale-Offset II, Runtracker, and STL Optimization Utility can be used immediately upon installation. Remote Notification and Remote Status require some setup and configuration to be useful. The sections that follow describe each utility in more detail.



Starting the Utilities

All of the utilities except Gettimes, Scale-Offset II, and Runtracker can be found on your Windows Start menu. To use the menu, select Start→ Programs→ Dtm. The Dtm menu appears. Select a utility from the menu to start it.

To start the Gettimes utility, use Windows Explorer to display the c:\dtm\bin directory and find the Gettimes.exe file. Double-click the filename. There are also several command-line options you can use with Gettimes; to issue command-line options, you must run Gettimes from an MS-DOS window. See [“Gettimes” on page 40](#) for more information.

For information on starting Scale-Offset II and Runtracker workbooks, see [“How to Use the Workbooks” on page 60](#).



Chapter 2

Remote Notification

The Remote Notification utility allows you to notify people via pager or e-mail when certain events occur during use of the SLS system. You can also have events trigger application programs or operating system commands.

The Remote Notification utility runs on the SLS system. It requires access to a modem, either locally or through a network.

This section includes the following topics:

- [Starting the Remote Notification Utility](#)
- [Setting Up Remote Notification](#)



Starting the Remote Notification Utility

To start the Remote Notification utility, select Start→ Dtm→ Remote Notify. The RemoteNotify window appears.

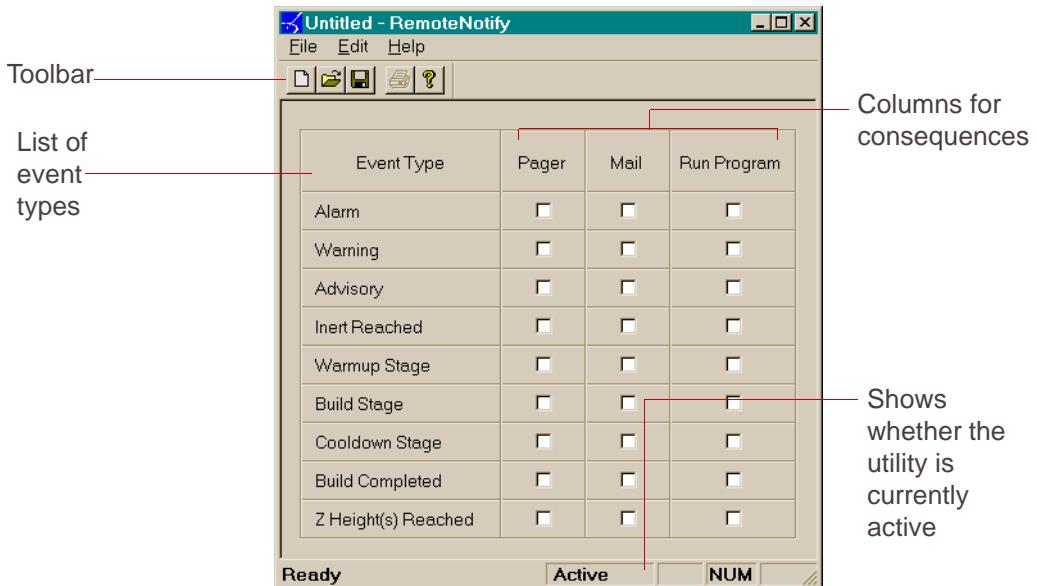


Figure 1. RemoteNotify Window

Activating and Deactivating the Utility

When you start the application, it is active, meaning it will send notifications. If you want to temporarily disable notification while the application is running (for example, to make changes to notification options), select File→ Deactivate. The words "Not Active" appear in the status bar at the bottom of the window. To activate the utility again, select File→ Activate.



Setting Up Remote Notification

Before you can use the Remote Notification utility, you must perform several setup tasks. These include selecting events that you want to be notified of, and entering the pager numbers, e-mail addresses, and application programs that you want the program to use when an event occurs.

Settings and Data Files

The Remote Notification utility stores two kinds of information: settings files and data files. *Settings files* store your choices of what events should cause someone to be notified and how they should be notified. They use the .cfg extension. *Data files* store names, e-mail addresses, and codes. They use the .dat extension. Both types of files are stored in the c:\dtm\config\RemoteNotify directory.

You can have several settings files, but each accesses the same Address Book for e-mail addresses and Code Book for pager codes.

After you start entering setup information, you should save a settings file by selecting File→ Save or clicking .

When you initially start the utility, the settings file is untitled.

You can load an existing settings file by selecting File→ Open or clicking .

 The Remote Notification utility keeps a list of recently-used settings files on the File menu.

Events and Consequences

Remote Notification is based on events and consequences. *Consequences* are the actions the Remote Notification utility takes when a specific type of event occurs.

The *events* that can trigger consequences include:

- Alarms, warnings, and advisories: You can select different consequences for each of these three types of messages.



- Inert reached: The system has inerted the process chamber.
- Stages and completion: You can select consequences for the system's entry into each of the three build stages (warm-up, cool-down, and build) as well as for build completion.
- Remote Notification will send a build complete message whether the build ends normally or due to a problem.
- Z heights reached: You can select consequences for the system to apply when the build reaches specific Z heights. See ["Setting Up Z-Height Triggers" on page 28](#) for more information.

For each type of event, you can select the following consequences:

- The utility pages one or more persons.
- The utility sends e-mail to one or more persons.
- The utility runs one or more programs.
- Any combination of the above.

Selecting Consequences

The RemoteNotify window contains a table with a row for each type of event. In each row, you can select a check box for each type of consequence. For example, the following figure shows the RemoteNotify window with Pager and Mail consequences selected for Alarm events:

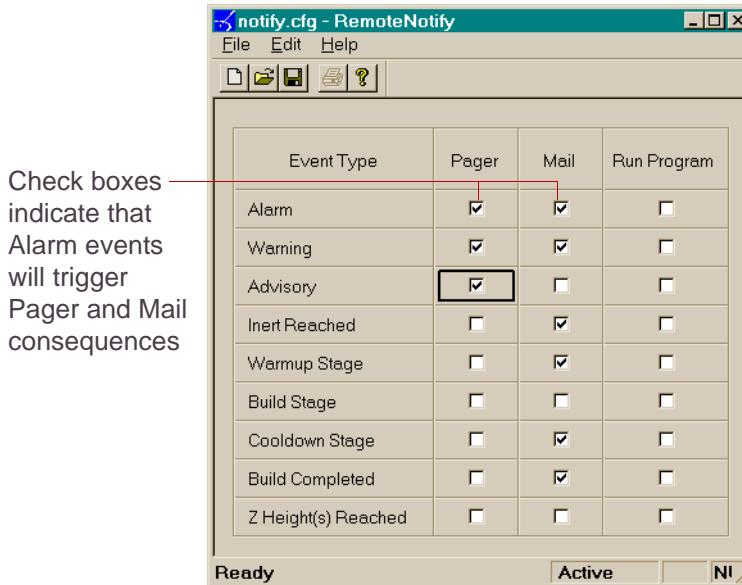


Figure 2. RemoteNotify Window with Consequences Selected

In addition to selecting the check boxes, you must set up the details of each consequence as described in the sections that follow.

Printing Settings

You can print the table of settings and consequences shown in the RemoteNotify window by selecting File→ Print or clicking .



Event Type	Pager	Mail	Run Program
Alarm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advisory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inert Reached	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Warmup Stage	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Build Stage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooldown Stage	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Build Completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Z Height(s) Reached	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 3. Sample Settings Printout

Setting Up Pager Notification

To use pager notification, you must:

1. Set up the modem server.
2. Set up the pager.
3. Create a phone book
4. Create a code book.
5. Create pager lists for each event that should result in someone being paged.

The sections that follow describe each of these steps in detail.

Setting Up the Modem Server

Before you can use the pager notification features of the Remote Notification utility, you must install and run the Modem Server software on a computer with a modem. The modem server software is included on the SLS systems software CD. You can



use a modem connected to the SLS system directly, or a network modem, as shown in Figure 6.

Installing the Modem Server

 The Modem Server software is installed on all SLS systems. If you intend to use a network modem rather than a modem installed in the SLS system computer, the Modem Server software must be installed on the computer that has the network modem.

To install the modem server, perform a standard SLS system software installation as described in [“Installing or Uninstalling the Software” in Chapter 3](#) of your *Reference Guide*. The modem server is automatically installed as part of the system.

Running the Modem Server

After you complete the installation, run the ModemServer.exe program located in `c:\dtm\bin`. The DTM Modem Server window appears:

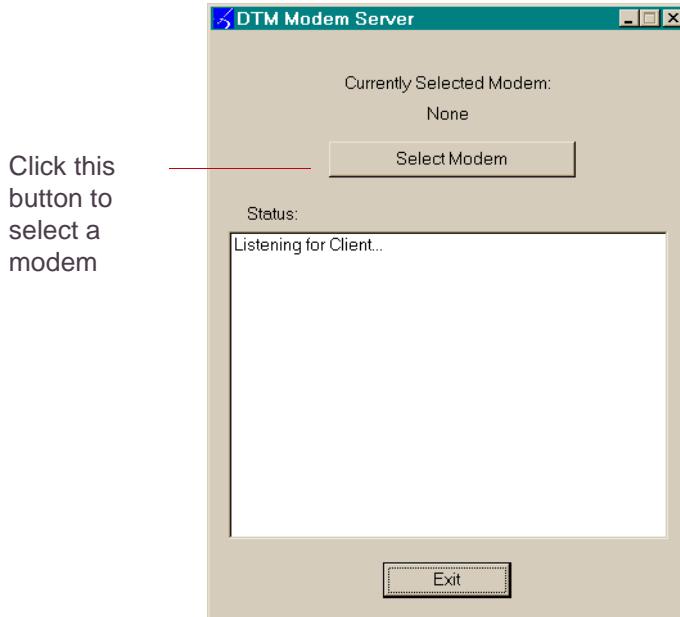


Figure 4. DTM Modem Server Window

Select a modem by clicking the **Select Modem** button and make a selection from the drop-down list in the dialog box that appears.

The DTM Modem Server application must be running before you start the Remote Notification application. It must remain running at all times while the Remote Notification application is running.

➤ After you run the Modem Server, find out the IP address of the computer with the modem so that you can use it in setting up the pager. Determine if your network uses dynamic addressing, and if it does, ask your system administrator to set a static address for the computer with the modem.



Setting Up the Pager

To set up the pager, start Remote Notification and select Edit→ Pager Setup. The Pager Setup dialog box appears. Enter appropriate values in the two text boxes.

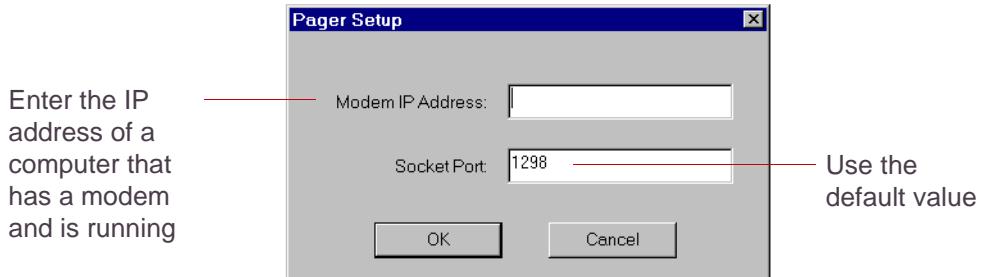
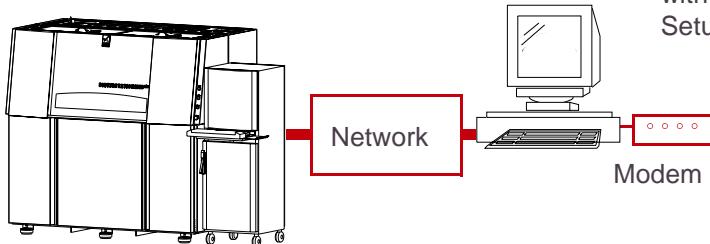


Figure 5. Pager Setup Dialog Box

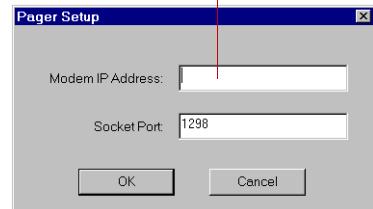
Modem IP Address is the internet protocol (IP) address of a computer with a modem. This computer must be running the DTM Modem Server application as described in [“Setting Up the Modem Server” on page 8](#).

 Avoid using the IP address 192.88.202.1, which is reserved by the SLS system for use in communicating with its internal scanner computer.

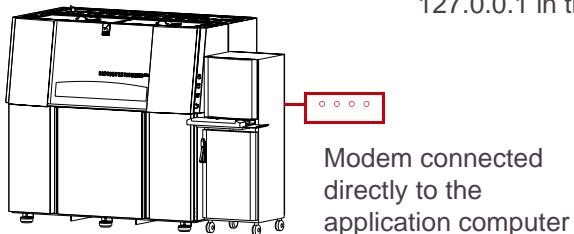
Network modem



Use IP address of the computer with the modem in the Pager Setup dialog box



Local modem



Use the self-referential IP address 127.0.0.1 in the Pager Setup dialog box

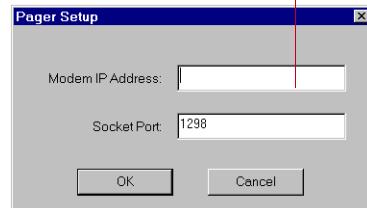


Figure 6. Possible Modem Configurations and IP Addresses

Socket Port is the address of the modem interface application that handles paging requests from the Remote Notification utility.

 Use the default Socket Port number unless instructed to change it by 3D Systems.

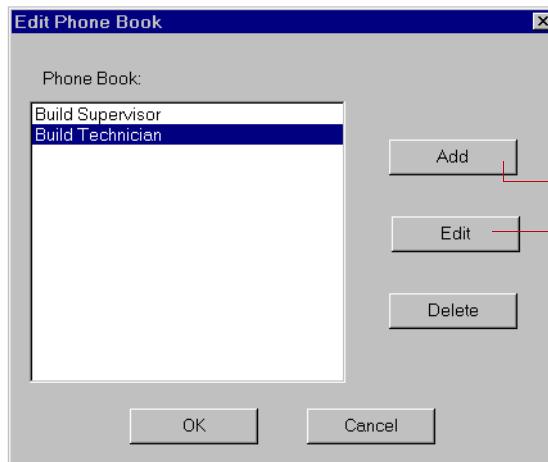


Creating a Phone Book

A phone book provides a list of phone numbers that you can page from the Remote Notification utility. To create a phone book for your company:

1. Select Edit→ Phone Book.

The Edit Phone Book dialog box appears.



Click the Add button to display a dialog box where you can add names and pager numbers

Select a name, then click the Edit button to change a name or pager number

Figure 7. Edit Phone Book Dialog Box

2. For each phone number you want to add to the phone book, complete the following steps:
 - a. Click the Add button.

The Edit Phone Book Entry dialog box appears.



The screenshot shows a dialog box titled "Edit Phone Book Entry". It has a blue title bar with a close button (X) on the right. The dialog contains three text input fields: "Name" with the text "Build Technician", "Phone Number" with the text "555-555-3234", and "Pager Delay" with the text "14" and the unit "seconds" to its right. At the bottom of the dialog are two buttons: "OK" and "Cancel".

Figure 8. Edit Phone Book Entry Dialog Box

- b.** Enter appropriate information in the Name, Phone Number, and Pager Delay text boxes.

 If a prefix, such as the number 9, must be dialed first to get an outside line from your home system, include it in the Phone Number text box—even if you have already set up the prefix for an outside line in the Telephony control panel.

- c.** Click the OK button.

The new phone book entry appears in the Edit Phone Book dialog box, listed by name.

- 3.** To make changes to any phone book entry, select the entry in the list on the Edit Phone Book dialog box, then click the Edit button.

The Edit Phone Book Entry dialog box appears. Make any needed changes in the text boxes, then click the OK button.

- 4.** To delete an entry, select the entry in the list, then click the Delete button.



- When you are finished making changes to your phone book, click the OK button on the Edit Phone Book dialog box.

Creating a Code Book

A code book in Remote Notification is a list of codes that the utility can send to pager numbers. A code is a string of numbers. You give each code a name in the code book for your reference, but only the numbers are sent to the pager.

 Some number sequences will not work with some pagers; you should manually test all codes before using them in a code book.

Choose codes that are easy to recognize and make sure you communicate their meanings to the recipients before using. The following list gives some sample codes you might use:

Code Name	Code
Alarm	911
Warm-up Stage	1
Build Stage	11
Cool-down Stage	111
Build Complete	1111

You create a code book in the same way that you create a phone book. Select Edit→Code Book, then continue with step 2 of the procedure in the preceding section. Read all references to “Phone Book” as “Code Book.”

Creating Pager Lists

You can create a pager list for each event type. This list defines the pager numbers that will be dialed if an event of that type occurs. To create a pager list:



1. Double-click a cell in the Pager column of the Remote Notification window.

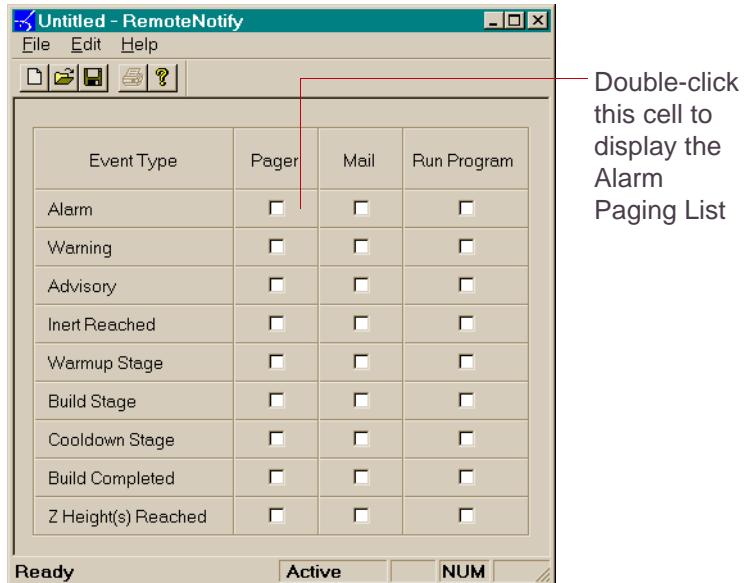


Figure 9. Displaying the Paging List

The Paging List dialog box appears.



Select a name from the Phone Book list

Then click the right arrow button to move the name to the To be paged list

Names in list are displayed next to the code that will be sent for that name

To change the assigned code for a name, select the name in the To be paged list

Then select a code for the name

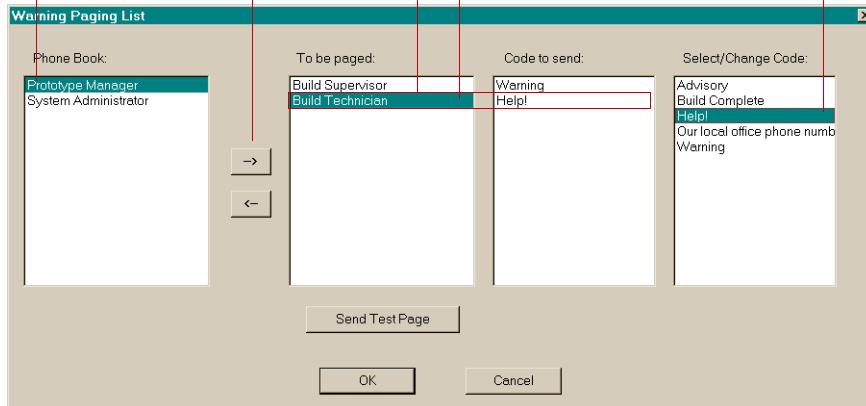


Figure 10. Sample Paging List Dialog Box

 You can also display the list by selecting the cell and then pressing the right trackball button, or by selecting the cell and selecting Edit→ Pager List.

2. Add names and select a code for each name.

- a. To add names to the To be paged list, select an entry from the Phone Book list and click . Repeat until all the people you want to page are on the list.
- b. To select codes, first select a name in the To be paged list, then select a code in the Select/Change Code list.



Each name in the To be paged list can have one code that will be sent to its pager when the appropriate event occurs.

3. *If desired*, click the Send Test Page button.
4. Click the OK button.

Setting Up E-Mail Notification

The Remote Notification utility can send e-mail to a different list of recipients for each event type. The e-mail message that the utility sends contains the type of event, the name of the computer sending the message, the text of the message, and a time stamp. For example:

```
Alarm from DTM17
```

```
The PLC has stopped executing
```

```
Monday, Apr 15 09:10:07 1998
```

To use e-mail notification, you must:

1. Set up e-mail.
2. Create an address book.
3. Create mailing lists.

The sections that follow describe each of these steps in detail.

Setting Up E-Mail

To set up e-mail, select Edit→ Mail Setup. The Mail Setup dialog box appears. Enter appropriate values in the two text boxes.



Figure 11. Mail Setup Dialog Box

Mail Server is the domain name of your mail server.

"From" Address is the address that will appear in the From header on the e-mail sent by the Remote Notification utility. This can be any text string and does not have to be a valid e-mail address. If it is not a valid e-mail address, recipients will not be able to reply to e-mails sent by the utility.

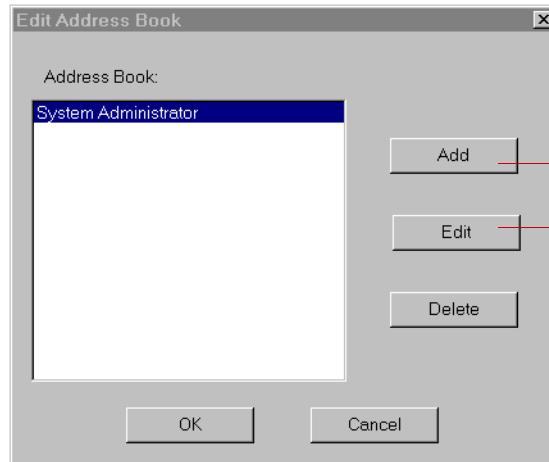
 You may want to enter the address of a system administrator or SLS system technician so that replies go to someone equipped to handle them, or you may want to enter a nonexistent address so that no replies are possible.

Creating an Address Book

An address book is a list of addresses to which the Remote Notification utility can send e-mail. It works much like the Phone Book and the Code Book that you create to use with pagers. To create an address book for your company:

1. Select Edit→ Address Book.

The Edit Address Book dialog box appears.



Click the Add button to display a dialog box where you can add names and e-mail addresses

Select a name, then click the Edit button to change a name or e-mail address

Figure 12. Edit Address Book Dialog Box

2. For each e-mail address you want to add to the book, complete the following steps:
 - a. Click the Add button.

A secondary Edit Address Book dialog box appears.

Enter the name
that will appear
in the address
book list

Enter the
actual e-mail
address

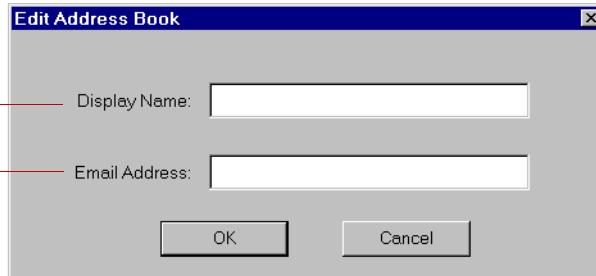


Figure 13. Secondary Edit Address Book Dialog Box

- b.** Enter appropriate information in the Display Name and Email Address text boxes.
- c.** Click the OK button.

The new address book entry appears in the Edit Address Book dialog box, listed by name.

- 3.** To make changes to any address book entry, select the entry in the list on the Edit Address Book dialog box, then click the Edit button.

The Edit Address Book Entry dialog box appears. Make any needed changes in the text boxes, then click the OK button.

- 4.** To delete an entry, select the entry in the list, then click the Delete button.
- 5.** When you are finished making changes to your address book, click the OK button on the Edit Address Book dialog box.



Creating Mailing Lists

You can create a different mailing list for each event type. This list defines the e-mail addresses to which mail will be sent if an event of that type occurs. To create a mailing list:

1. Double-click a cell in the Mail column of the Remote Notification window.

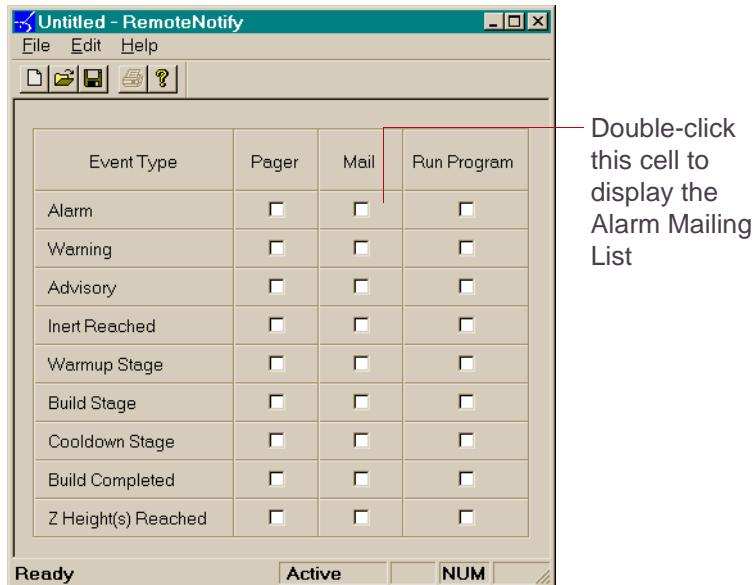


Figure 14. Displaying the Mailing List

The Mailing List dialog box appears.

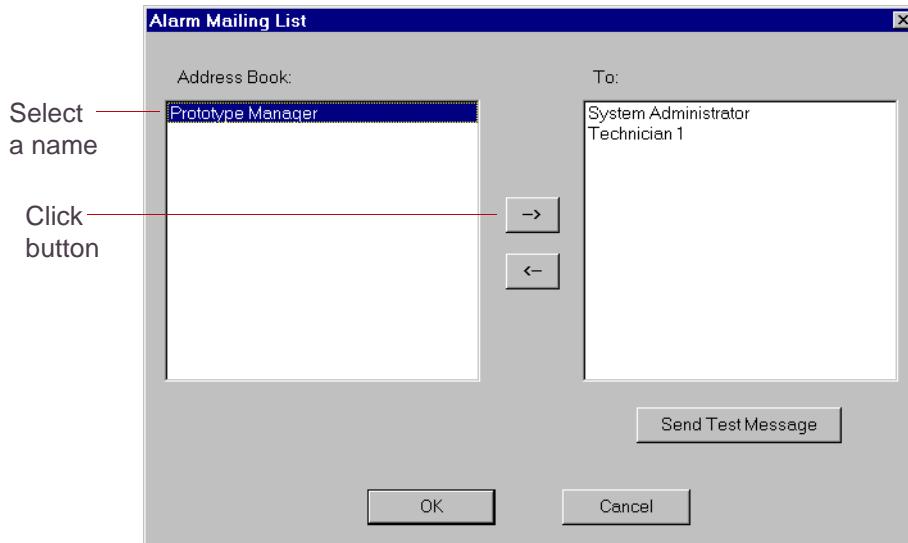


Figure 15. Sample Mailing List Dialog Box

 You can also display the list by selecting the cell and then pressing the right trackball button, or by selecting the cell and selecting Edit→ Mailing List.

2. Select a name in the Address Book list and click  to move it to the To list.
3. Repeat step 2 until all desired names are in the To list.
4. *If desired*, click the Send Test Message button.
5. Click the OK button.

Setting Up Programs

You can have the Remote Notification utility launch programs or issue commands when specific types of events occur.



To use these features, you must:

1. Create a program book.
2. Create program lists.

The sections that follow describe each of these steps in detail.

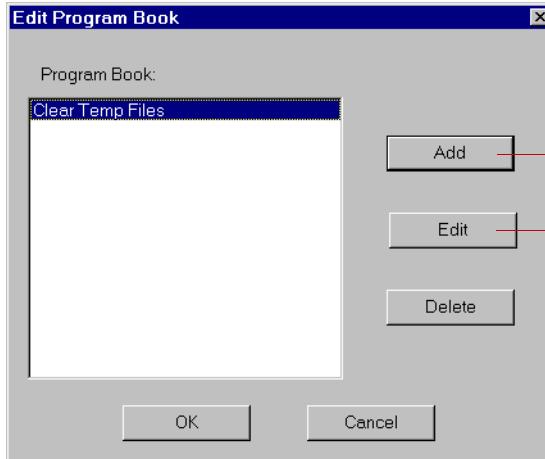
Creating a Program Book

A program book is a list of programs and/or system commands that you can have the Remote Notification utility launch. It works much like the Phone Book, the Code Book, and the Address Book. (Programs and system commands are treated the same by the Remote Notification utility.)

To create a program book for your company:

1. Select Edit→ Program Book.

The Edit Program Book dialog box appears.



Click the Add button to display a dialog box where you can add program names and commands

Select a name, then click the Edit button to change a name or command

Figure 16. Edit Program Book Dialog Box

2. For each program you want to add to the book, complete the following steps:
 - a. Click the Add button.

A secondary Edit Program Book dialog box appears.

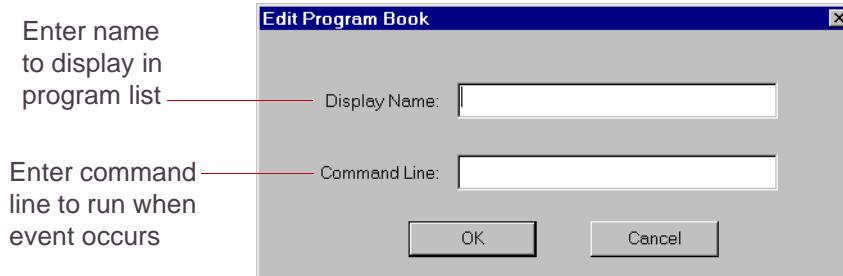


Figure 17. Secondary Edit Program Book Dialog Box

- b. Enter appropriate information in the Display Name and Command Line text boxes.
- c. Click the OK button.

The new program book entry appears in the Edit Program Book dialog box, listed by name.

3. To make changes to any program book entry, select the entry in the list on the Edit Program Book dialog box, then click the Edit button.

The Edit Program Book Entry dialog box appears. Make any needed changes in the text boxes, then click the OK button.

4. To delete an entry, select the entry in the list, then click the Delete button.
5. When you are finished making changes to your program book, click the OK button on the Edit Program Book dialog box.

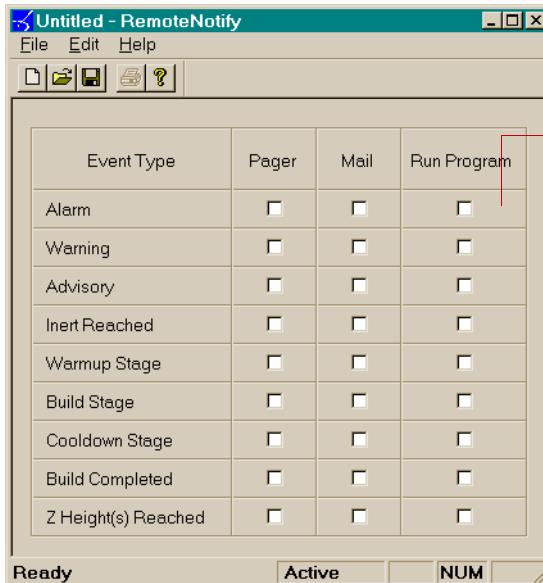
Creating Program Lists

You can create a different program list for each event type. This list defines the



programs that will be launched if an event of that type occurs. To create a program list:

1. Double-click a cell in the Run Program column of the Remote Notification window.



Double-click this cell to display the Alarm Program List

Figure 18. Displaying the Program List

The Program List dialog box appears.

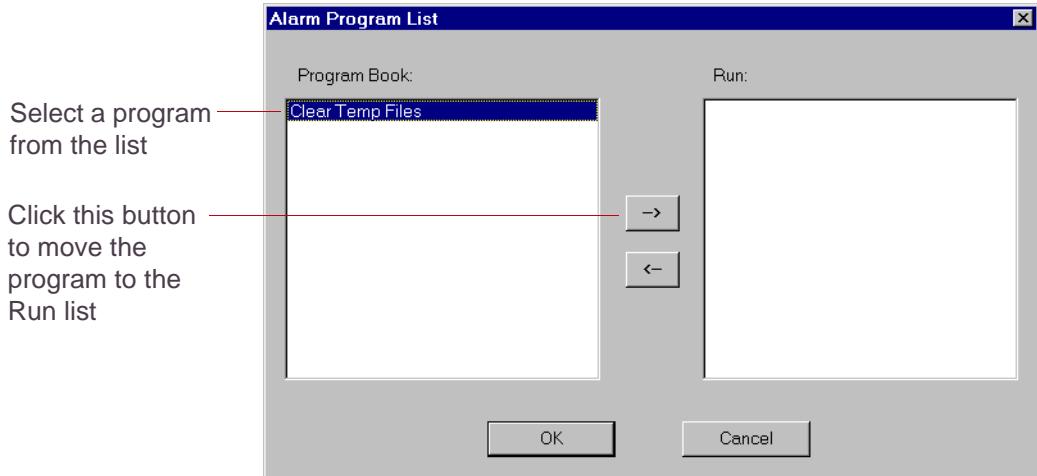


Figure 19. Sample Program List Dialog Box

 You can also display the list by selecting the cell and then pressing the right trackball button, or by selecting the cell and selecting Edit→ Program List.

2. Select a name in the Program Book list and click  to move it to the Run list.
3. Repeat step 2 until all desired names are in the To list.
4. Click the OK button.

Setting Up Z-Height Triggers

You can use Z-height triggers to select points in a particular build at which you want specific consequences to occur. To set up Z-height triggers:

1. Select Edit→ Z Height Triggers.

The Edit Z Height Triggers dialog box appears.

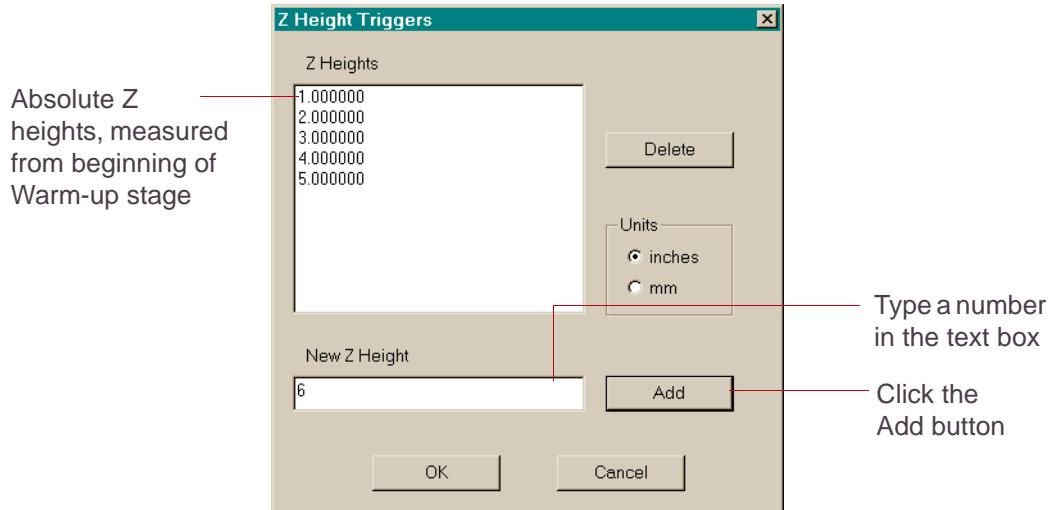


Figure 20. Edit Z Height Triggers Dialog Box

2. Type a number in the New Z Height text box and click the Add button.

Each Z height that you enter will trigger a Z Heights Reached event, and produce the consequences you have selected for that type of event.

3. Repeat step 2 until you have entered all desired Z heights.
4. Click the OK button.



Chapter 3

Remote Status

The Remote Status utility allows you to check the status of a build or view temperatures and parameters for the SLS system via a dial-up connection or through a computer connected to your SLS system computer across a network.

This section includes the following topics:

- [Features of Remote Status](#)
- [Installing the Utility on a Client System](#)
- [Connecting and Starting the Utility](#)
- [Using the Remote Status Utility](#)



Features of Remote Status

The Remote Status utility's window looks similar to the standard SLS system software main window. It connects to a *host system* (a system connected to an SLS system and running the SLS system software) and displays a view-only version of the host's window on your *client system* (one connected to the host via a network, and running the Remote Status utility).

The following figure shows the Remote Status application after you have connected to a host system that is currently building parts:

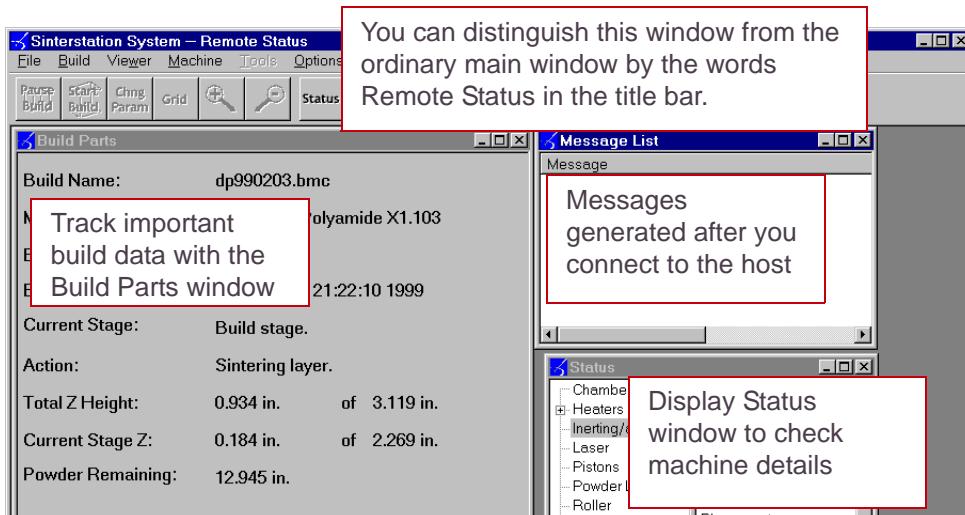


Figure 21. Remote Status Application When Connected

➤ If the host system is in Manual Operations mode, the application displays the Manual Operations dialog boxes as soon as they are displayed on the host.



Installing the Utility on a Client System

 You can install the Remote Status utility on any Windows 95, 98, NT, or 2000 system connected to your SLS system via a network.

 3D Systems believes that the Remote Status utility will work on a Windows 98 system; however, this configuration *has not been tested*.

To install Remote Status, perform a standard SLS system software installation as described in [“Installing or Uninstalling the Software” in Chapter 3](#) of your *Reference Guide*.

Changing Your Font Setting

If dialog boxes displayed in the Remote Status utility look unusual to you, your system’s display font setting may be set to Small Fonts. The SLS system software interface is designed to use the Large Fonts setting. To correct this situation:

1. Click your right trackball button on the background of your desktop.

A popup menu appears.

2. Select Properties from the popup menu.

The Display Properties dialog box appears.

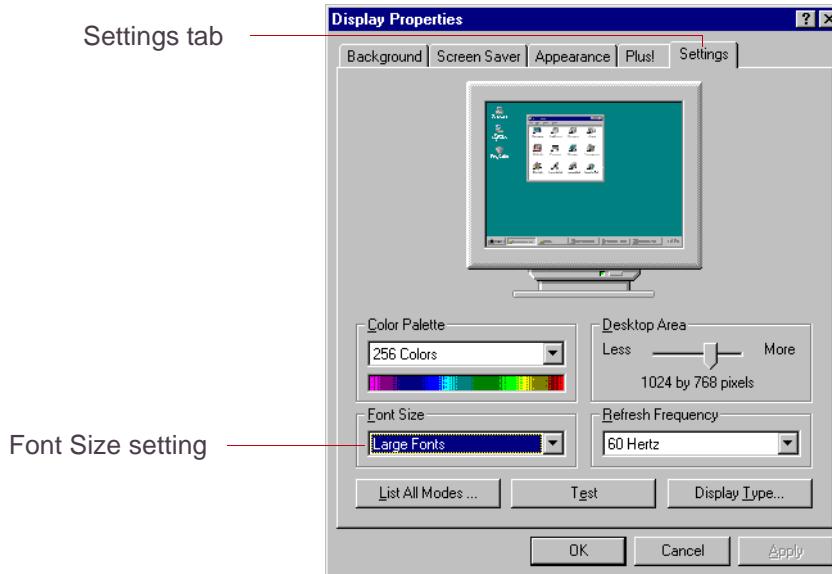


Figure 22. Display Properties Dialog Box

3. Select the Settings tab.
4. Select the Large Fonts setting.
5. Click the Apply button.

You will need to restart your computer system before the new settings will take effect.



Connecting and Starting the Utility

Before you can start the Remote Status utility, you must be connected to the host computer through a network or through a dial-up connection. If you plan to use a dial-up connection, perform the dial-up and connect to your normal server before you run the utility.

To start the Remote Status utility, click on the Remote Status menu option. You can find this option in your Windows Start menu, on the DTM submenu.

The Remote Status window and the Connection dialog box appear:

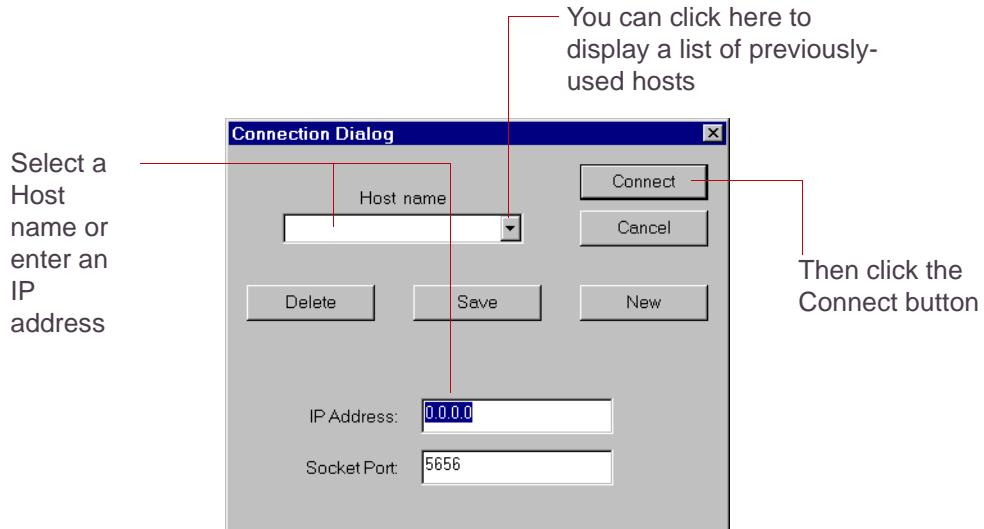


Figure 23. Connection Dialog Box

Select a host name from the list in the Host name box (click the down arrow to see a



list) or enter the IP address of the host system. Then click the Connect button.

 Use the default Socket Port number unless instructed to change it by 3D Systems.

After you click the Connect button, the system attempts to make a connection and if successful, displays the Remote Status window.

Managing Host Information

You can store host information with the Connection dialog box so that you do not have to memorize IP addresses. To store a host IP address, start the utility to display the Connection dialog box. Click the New button and enter a host name in the Host name box. Enter the IP address in the IP address text box. Finally, click the Save button.

Use the Delete button to remove a host name from the list.



Using the Remote Status Utility

You can use the Remote Status utility in the following ways:

- To track a build
- To check parameters in a Status window

Tracking a Build with Remote Status

To track a build on a host system, click  after you launch the Remote Status utility. If the host system is building parts, the Build Parts window appears in your Remote Status window. This window is a duplicate of the host system's Build Parts window. If the host system is *not* building parts, the application tells you that.

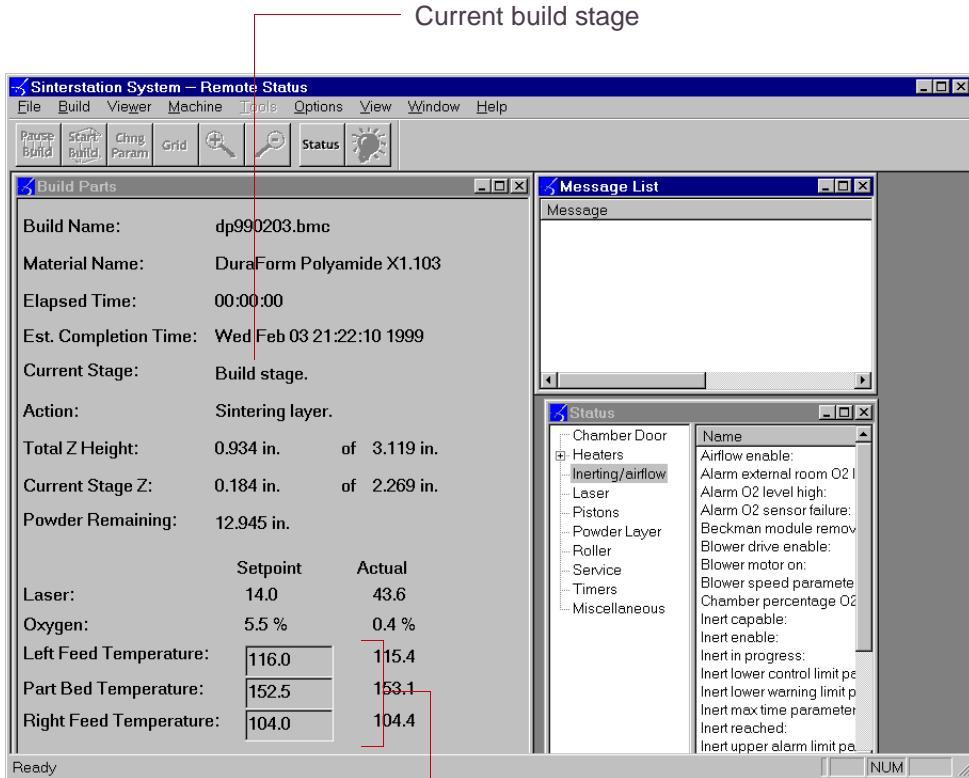


Figure 24. Build Parts Window in Remote Status Utility

If the host system is not currently running a build when you click , the system displays the message SinterStation is not currently building.

 The Build Viewer window is not available from the Remote Status utility.



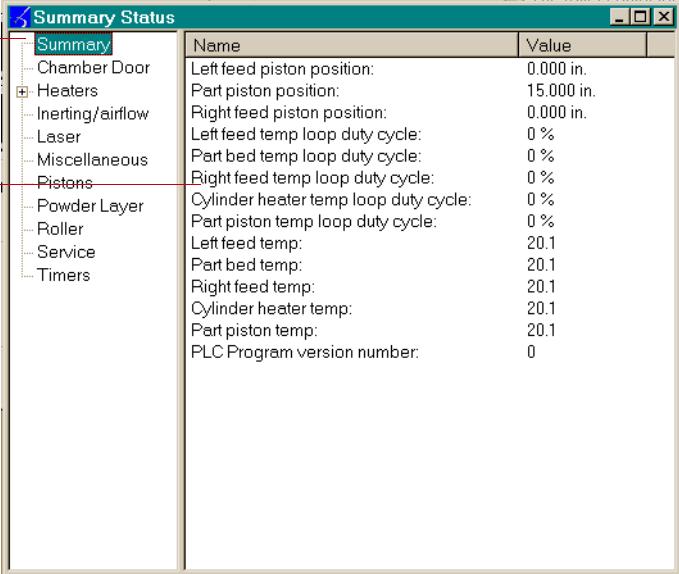
Viewing a Status Window with Remote Status

Status windows in the Remote Status utility operate just as they do in the SLS system software. To open a Status window, select Machine→Status from the main menu or

click . A Status window appears. For more information on Status windows, see [Chapter 5, “Using Status Windows”](#) in your *Reference Guide*.

Select a category on the left

The system displays an appropriate list of messages on the right



Name	Value
Left feed piston position:	0.000 in.
Part piston position:	15.000 in.
Right feed piston position:	0.000 in.
Left feed temp loop duty cycle:	0 %
Part bed temp loop duty cycle:	0 %
Right feed temp loop duty cycle:	0 %
Cylinder heater temp loop duty cycle:	0 %
Part piston temp loop duty cycle:	0 %
Left feed temp:	20.1
Part bed temp:	20.1
Right feed temp:	20.1
Cylinder heater temp:	20.1
Part piston temp:	20.1
PLC Program version number:	0

Figure 25. Status Window

Viewing Manual Operations

If Manual Operations dialog boxes are being used on the host system while you are connected to it via the Remote Status utility, the dialog boxes will be mirrored in your



Remote Status window. You can view the values and settings in the dialog boxes, but you cannot activate any of the functions from the Remote Status utility.

Message List Window

The message list window displays messages generated during the time that your client system has been connected to the host. Messages generated before you connected cannot be displayed.



Chapter 4

Gettimes

The Gettimes utility runs on the SLS system computer. It creates a brief report from the detailed information recorded in the states.blog file. It reports the times required for adding a powder layer, loading the scanner, sintering a layer, and slicing a layer, as well as total stage times for the warm-up, build and cool-down stages.

The Gettimes utility operates by reading the states.blog (in the c:\dtm\logs directory) file and outputting its report to a file named time.data.



Running Gettimes

You should start the Gettimes utility from an MS-DOS Command Prompt window within the Windows environment.

1. To display an MS-DOS Command Prompt window, display the Start menu. Look for the  Command Prompt option and select it.

An MS-DOS Command Prompt window appears.

2. Change to the `c:\dtm\bin` directory.

Your prompt should show you the current directory.

Type `cd c:\dtm\bin` and press Enter.

3. In the window, type `gettimes` and press Enter.

The system displays the following message:

```
Get Build Times Version x7.0
```

Command-line Options

There are three command-line options available with Gettimes. To use these options, you type additional information after the command name in the MS-DOS Command Prompt window.

 You can use any of these options in combination and in any order; type a space between each option.

-i

The `-i` option is used to change the name of the input file. To use this option, type the filename after the `-i` with no intervening spaces. For example, to cause the Gettimes utility to use a file named `OurMachineState.blog` as input instead of the default



states.blog, type the following command:

```
gettimes -iOurMachineState.blog
```

If the new input file is not in the current directory, you must give the full pathname.

-o

The `-o` option is used to change the name of the output file. As with `-i`, type the filename after the `-o` with no intervening spaces. For example, to send the output to a file named `MyTimes` instead of the default `time.data`, type the following command:

```
gettimes -oMyTimes
```

-f

Using the `-f` option causes `Gettimes` to include time values for each individual action, such as adding a powder layer or loading the scanner, rather than the default method of printing a summary of the total time spent in these actions.



Sample Output

The following text shows sample output from running `Gettimes`:

```
Start inert, TIME = Mon Nov  9 11:21:07 1998
Inert reached, TIME = Mon Nov  9 11:31:28 1998
    Time to inert = 0:00:10:21
New stage: Build setup, TIME = Mon Nov  9 14:05:27 1998
Start build: /usr2/sls2k/build/cpCallaway1.ja, TIME = Mon Nov
9 14:05:37 1998
Start inert, TIME = Mon Nov  9 14:05:42 1998
Inert reached, TIME = Mon Nov  9 14:05:49 1998
    Time to inert = 0:00:00:07
    Time in stage = 0:00:00:29
New stage: Warmup, TIME = Mon Nov  9 14:05:56 1998
    Time in stage = 0:02:13:56
New stage: Build, TIME = Mon Nov  9 16:19:52 1998
    Time in stage = 0:00:08:17
End of build stage:
    Total slice time = 0:00:00:26
    Total time waiting on the slicer = 0:00:00:00
    Total add layer time = 0:00:02:10
    Scanner load time overlapped with sintering/add powder
layer = 0:00:01:03
    Scanner load time not overlapped with sintering/add
powder layer = 0:00:00:00
```



```
Total sinter time = 0:00:06:00
Total wait for temperature time = 0:00:00:00
Total paused time = 0:00:00:00
End of build, TIME = Mon Nov  9 16:28:09 1998
Total build time = 0:02:22:32
New stage: Build setup, TIME = Mon Nov  9 16:28:13 1998
Start build: /usr2/sls2k/build/cpCallaway2.ja, TIME = Mon Nov
9 16:28:22 1998
Start inert, TIME = Mon Nov  9 16:28:25 1998
Inert reached, TIME = Mon Nov  9 16:28:32 1998
Time to inert = 0:00:00:07
Time in stage = 0:00:00:35
New stage: Build, TIME = Mon Nov  9 16:28:48 1998
Time in stage = 0:15:04:32
End of build stage:
Total slice time = 0:00:24:21
Total time waiting on the slicer = 0:00:00:00
Total add layer time = 0:03:57:49
Scanner load time overlapped with sintering/add powder
layer = 0:03:54:41
Scanner load time not overlapped with sintering/add
powder layer = 0:00:00:11
Total sinter time = 0:11:05:28
Total wait for temperature time = 0:00:00:46
```



```
Total paused time = 0:00:00:00
New stage: Cooldown, TIME = Tue Nov 10 07:33:20 1998
    Time in stage = 0:05:02:31
End of build, TIME = Tue Nov 10 12:35:51 1998
    Total build time = 0:20:07:29
```



Chapter 5

Build Report

The Build Report utility extracts build information from SLS system log files and build packets. The files produced by the utility can be imported into a spreadsheet application for further manipulation.

 You must have SLS system log files and build packets available to use with the Build Report utility. If you intend to create reports, make sure you do not delete the log files when you finish a session with the SLS system software.

This section covers the following topics:

- [Generating Reports](#)
- [Using Reports](#)

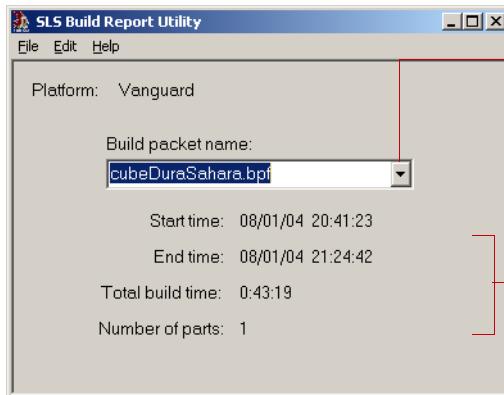


Generating Reports

To generate a custom report:

1. Start the Build Report utility.

You can start the utility by clicking a button on the summary dialog box that appears at the end of a build, or from the Start menu. From the Windows Start menu, select Start→ Programs→ SLS System→ Build Report. The SLS Build Report utility window appears.



Select a build packet (click the arrow to display a list of all build packets in the current log file)

Information about the selected build packet

Figure 26. Build Report Utility Window

2. Display the Preferences dialog box by selecting Edit→ Preferences.
3. Select the information you want in your report in the Preferences dialog box. See Figure 27., “Preferences Dialog Box,” on page 49.



The Preferences dialog box has three tabs. Click on a tab to change the options that are displayed. Each option has a check box. By default, most of the options are already checked. Click on a check box to check or uncheck that option. The system remembers your option choices the next time you run the utility, so if you repeatedly run the same kinds of reports, you need only select your options once.

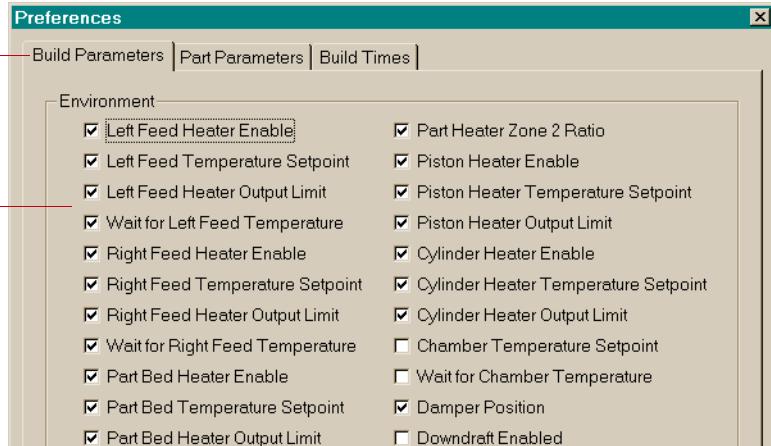
The available options include build parameters, part parameters, and build times. See Figure 27 for more information on build times.

When all the options in *all three tabs* are set the way you want, click the OK button to return to the SLS Build Report utility window.

Preferences dialog box

Click on tabs to select a set of options

Click on check boxes to turn options on or off (checked parameters are included in reports)



Build Times options

Select *either* Time Summaries or Detailed Times

If you select *Detailed Times*, select which of the listed options you want to appear in your report

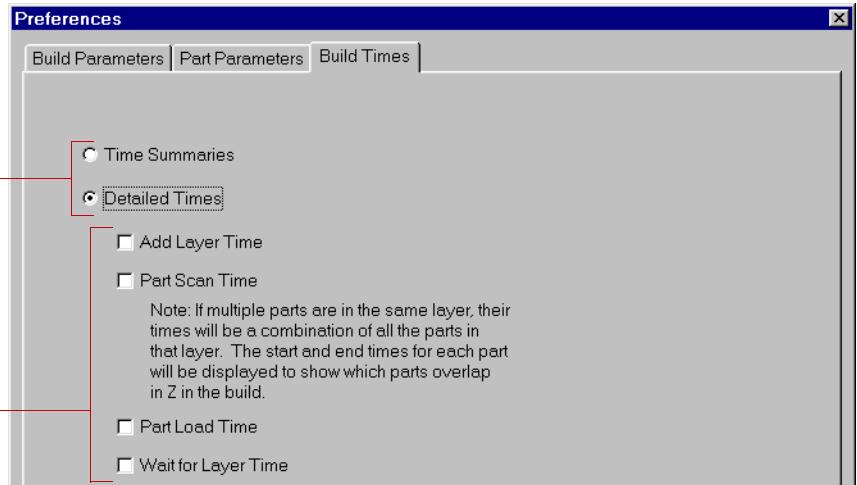


Figure 27. Preferences Dialog Box



4. Select a log file if needed.

The application automatically loads the log file in the c:\dtm\logs directory, if one exists. If you want to use a different log file, select File→ Select log file and use the Open dialog box to locate the file.

5. Save your report.

Select File→ Save build data. The Output Options dialog box appears.

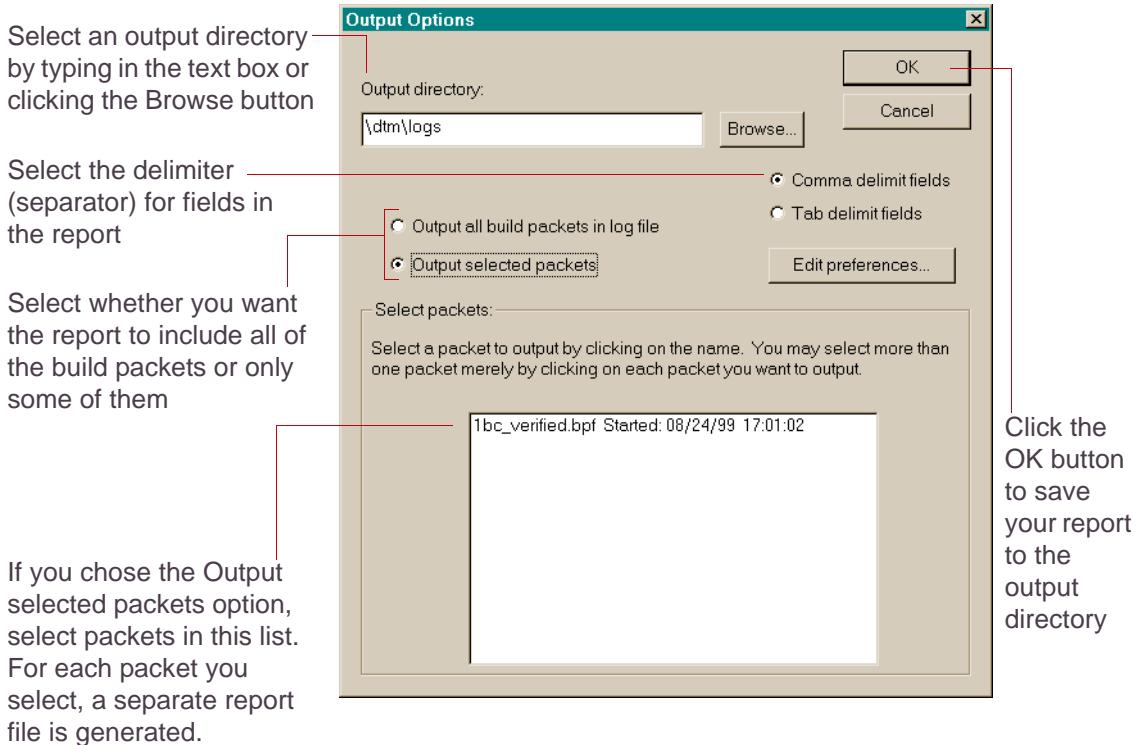


Figure 28. Output Options Dialog Box

6. Select the output options you want, as shown in Figure 28.
7. Click the OK button.

For each build selected, a file appears in the designated output directory (the default directory is \\dtm\logs). Each output file's name uses the format



buildpacketMMDDTTTT.rpt, where

buildpacket is the build packet file name minus the .bpf extension

MM is the number of the month

DD the day

TTTT the time when the build started.

For example, a report from a build packet named newmold.bpf built on February 2 at 11:02 a.m. would have the filename newmold02021102.rpt.

 If you change your preferences and save a report again without changing the output location, the new report will overwrite the old one.



Using Reports

The reports generated by the Build Report utility are text files with fields separated by either commas or tabs, depending on the delimiter you chose in the Output Options dialog box. These reports are designed to be imported into a spreadsheet or database application. You can use these reports to record the part parameters for each part in a build for later reference, or to track build and part parameters over time. This data can be used to improve part accuracy or to keep track of optimum parameters for builds. Figure 29 shows the basic format of a report generated by the utility.

 Build Report outputs all measurements in inches, because all values in the states.blog file are stored in inches. You can convert values to millimeters in your spreadsheet program if desired.

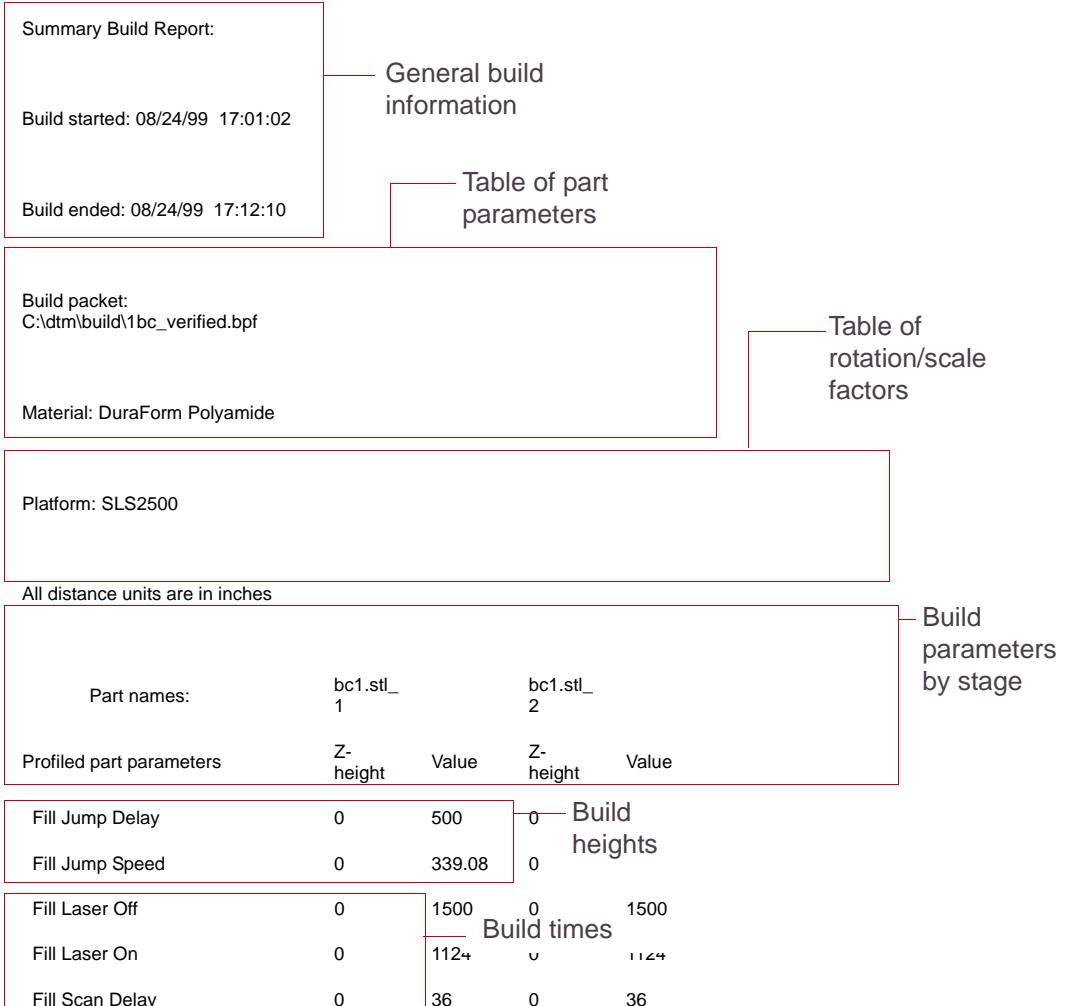


Figure 29. Report Format



Chapter 6

Scale-Offset II and DTMRuntracker Workbooks

This section describes the Scale-Offset II and DTMRuntracker workbooks. These are Microsoft Excel workbooks you can use to generate scale and offset values and track information about builds or parts over time.

 You can now purchase scale and offset calculation tools from 3D Systems that replace and improve on the functions provided by these workbooks. See the Scale Calculation Tools section of your Build Setup Help.

This section covers the following topics:

- [Minimum System Requirements](#)
- [Setting Up the Workbooks](#)
- [Uses for the Scale-Offset II Workbook](#)
- [How to Use the Workbooks](#)
- [Uses for the DTMRuntracker Workbook](#)



Minimum System Requirements

The workbooks require a Windows computer system with Microsoft Excel installed (version 97 or later). 3D Systems recommends a system with a minimum of 128 MB of RAM and a 200 MHz or faster Pentium processor.

The system you use to run the workbooks does *not* need to be same one you use to run the SLS system.

Solver Add-In

Before you can use these workbooks, you must have installed the Solver add-in. This is a file that adds capabilities to Excel. It is not included in the default Excel installation. See the documentation that came with your copy of Excel or the on-line help for instructions on installing the Solver add-in.



Uses for the Scale-Offset II Workbook

The Scale-Offset II workbook replaces previous methods for calculating scale and offset values. It allows you to use any part as a scale part; you can select a scale part based on the materials and geometries you are building. To scale a specific geometry, you can use the actual part—building it once, measuring it, and then generating scale and offset values to apply to future builds.

 You do not have to build an initial part without using scale and offset values in order to use the worksheet. The worksheet can handle parts that were built with constant scale and offset. If you want to use higher-order scale values, use the Opti-Scale™ scale calculation tools, an optional module available for the Build Setup application.



Uses for the DTMRuntracker Workbook

The DTMRuntracker workbook takes data from the Scale/Offset workbook and tracks changes over time. Some uses for this data include:

- Monitoring day-to-day machine variability
- Measuring scale and offset at predetermined intervals for a wide variety of geometries
- Fine-tuning parameters when repeatedly building the same geometries



Setting Up the Workbooks

You can find the two workbooks on the SLS system computer or on the SLS system software CD that came with your system. Use the latest release of the SLS system software.

They are .xls files found in the geometry\Samples\scale directory. To set up the workbooks, copy them onto the hard-disk drive of the system you want to use them on, or onto a network drive. There are two versions of the Scale-Offset II workbook, one for Windows NT and 2000 (ScaleOffset II 2000.xls), and one for Windows XP (ScaleOffset II XP.xls).

You must copy and rename the workbooks before you can use them. You may want to name the copies after the parts that you are measuring or the machines you are tracking.

 When you open one of these workbooks, Excel may display a message indicating that the workbook contains macros and offering to disable them. Be sure to enable macros; the workbooks require them.



How to Use the Workbooks

The following procedures outline how to use the workbooks. The first worksheet in each workbook contains detailed instructions for using the workbook.

To use the Scale-Offset II workbook for calculating scale and offset values:

1. Build a part and measure it.

The workbook calculates scale and offset values separately for each axis. For each axis that you want to scale, you will need at least three data points; 3D Systems recommends measuring at least five points.

You can use any part; see your *Material Process Release Notes* for recommendations.

2. Enter the nominal and measured dimensions into a copy of the Scale-Offset II workbook. Use the Data worksheet within the workbook.

 The original Scale-Offset II workbook is a read-only file; you must make a copy using the operating system or Excel's Save As feature before you can save changes.

 You can use any units with the Scale-Offset II workbook, as long as you are consistent. If you enter values in inches, you will get inch values out; if you enter values in millimeters, you will get millimeter values out. However, you must convert the Tolerance value from the default (0.002 inches) to an appropriate value for the unit you are using; for millimeters, change the X, Y, and Z tolerance to 0.051.

3. Calculate the scale and offset values.

To find the scale and offset values for each axis, click the Calculate X Values, Calculate Y Values, and Calculate Z Values buttons in the Data worksheet.



	A	B	C	D	E	F	G	H	I	
1	Scale/Offset Calculation Worksheet									
2		version:	2.005		last update:	10-Sep-99				
3			<input type="text"/>							
4										
5		<input type="button" value="Calculate X Values"/>			<input type="button" value="Calculate Y Values"/>			<input type="button" value="Calculate Z Values"/>		
6										
7										
8	X			Y			Z			
9	Tolerance: 0.002			Tolerance: 0.002			Tolerance: 0.002			
10	Input Scale: 1			Input Scale: 1			Input Scale: 1.02			
11	Input Offset: 0			Input Offset: 0			Input Offset: 0			
12										
13										
14	Measurement Data			Measurement Data			Measurement Data			
15	Nominal	Actual	Type	Nominal	Actual	Type	Nominal	Actual	Type	
16	0.5		Outer	0.5		Outer	3.202		Outer	
17	0.5		Outer	0.5		Outer	4.6		Inner	
18	1.5		Outer	1.5		Outer	4.6		Outer	
19	1.5		Outer	1.5		Outer	4.6		Outer	
20	2.5		Outer	2.5		Outer	4.6		Outer	
21	2.5		Outer	2.5		Outer	4.6		Outer	
22	3.5		Outer	3.5		Outer	4.6		Outer	
23	3.5		Outer	3.5		Outer	3.021		Outer	
24	4.5		Outer	4.5		Outer	2.77		Outer	

Figure 30. Scale/Offset II Workbook: Data Worksheet

To use the DTMRuntracker workbook to track scale and offset values:

1. Upload data *from a copy of the Scale/Offset II workbook* to a copy of the DTMRuntracker workbook.

 The copy of the DTMRuntracker workbook that you plan to use must be *closed* when you upload data to it.

In the *Scale/Offset II workbook's Data worksheet*, click the Upload X data to SPC, Upload Y data to SPC, and Upload Z data to SPC buttons in the Data worksheet.

 You will have to scroll to the right in the Data worksheet to see the Upload buttons.

2. Open the copy of the DTMRuntracker workbook.



3. Verify your data, and delete any redundant data.
4. In each of the Plot worksheets within the DTMRuntracker workbook, click the Update Plots button.
5. If desired, perform additional correlation as described in the DTMRuntracker workbook.

A worksheet within the workbook, Correlation Data, is devoted to correlation analysis of variables and user-defined variables.

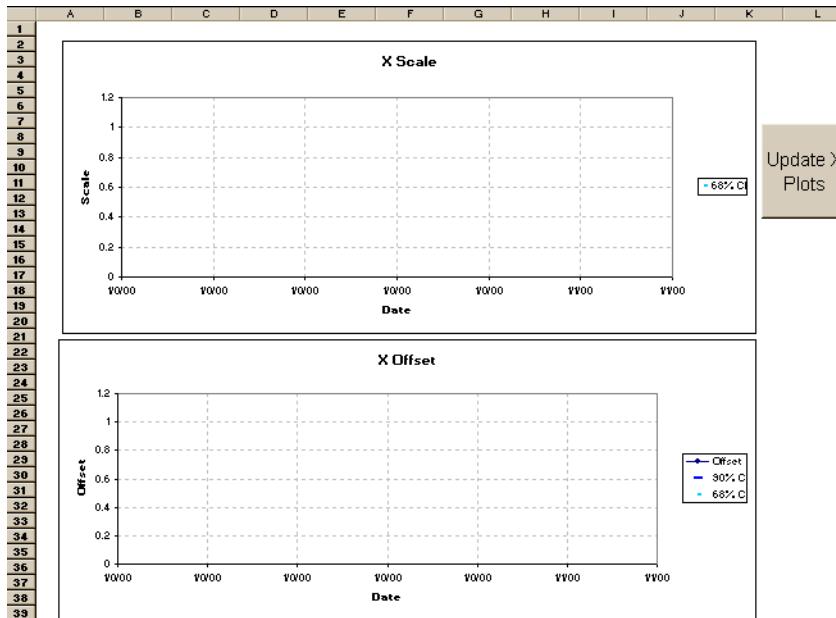


Figure 31. DTMRuntracker Workbook



Chapter 7

STL Optimization Utility

This section describes the STL Optimization Utility, an application that makes STL files load and display more quickly in the Build Setup application. It includes the following topics:

- [Why You Should Optimize Files](#)
- [How STL File Optimization Works](#)
- [Using the STL Optimization Utility](#)



Why You Should Optimize Files

Optimized files render and load up to 10 times faster than unoptimized files, and they remain valid STL files, editable by any application that accepts STL files

- If you edit an STL file in any application other than Build Setup, you should re-optimize it afterward.
- If you optimize an STL file *after* using the Dimension Tool to establish nominal dimensions for use with the Scale and Offset Calculation Wizard, the nominal dimensions will no longer be valid and must be selected again. See your Build Setup Help for information on using these Scale Calculation Tools.

STL files are the input files used in the SLS process; STL files are created by computer-aided design (CAD) software.

When you add an STL file to a build, the Build Setup application checks to see if it has been optimized; if it has not, the application asks if you want to optimize it. In most cases, you will not need to use the STL Optimization Utility as a separate application. However, it can be useful if you want to optimize large numbers of files at once.

If you want to know whether a particular file has been optimized, add the STL file to a build in the Build Setup application, then display the Information View and look at the Part Info tab. If it is optimized, the file's File Type will be listed as Optimized Binary.



Using the STL Optimization Utility

To use the utility to optimize one or more files:

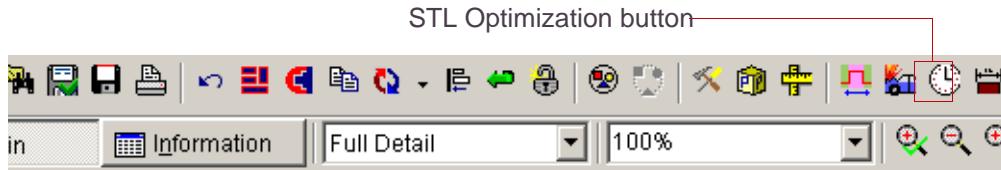


Figure 32. STL Optimization Button on the Build Setup Toolbar

1. Start the utility from within the Build Setup application by selecting Tools→Optimize STL Files, by clicking the appropriate icon on the toolbar, or from the Windows Start menu by clicking Start→Programs→SLS System→STL Optimization.

The 3D Systems STL File Optimization Utility window appears.

2. Select the STL files you want to optimize.

You can select any combination of files and/or directories.



File/directory list

Select drive and
directory

Select file or files

When you click
this button,
the utility
adds the
currently-
selected
file or
directory
to the list
on the right
(if
no file is
selected,
a
directory
is added)

To remove an
item from the
file/directory
list,
select it and
click
this button

Click the Next
button
when you have
selected
all the files
you want to
optimize

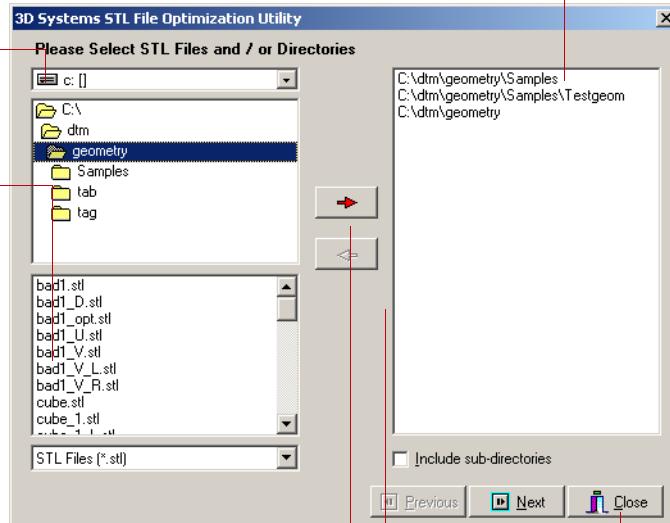


Figure 33. Selecting Files/Directories to Optimize

3. Click the Next button.

An options window appears.

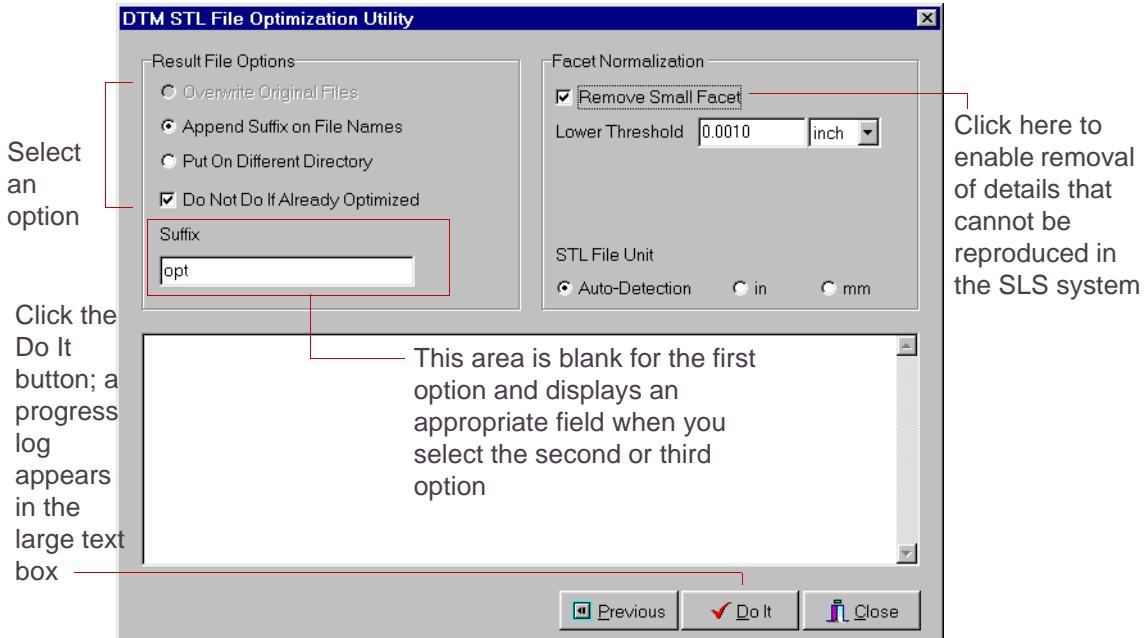


Figure 34. STL Optimization Utility Options Window

4. Select an option.

If you select the Append Suffix option, enter a suffix or accept the default “opt” suffix.

If you select the Put On Different Directory option, select an output directory.

5. Select or deselect the Do Not Do if Already Optimized check box.



6. If you want the system to compress your STL files, select the Remove Small Facets check box.

 Since this option modifies your STL file, the system disables the Overwrite Original Files option if you select Remove Small Facets.

You can select a Lower Threshold setting to indicate when facets are too small to be useful.

7. Click the Do It button.

The utility processes the files and displays a progress log in the large text box on the window. The Do It button changes to a Cancel button while the utility is processing the files, then to a Close button when done.

8. To process additional files, click the Previous button to return to the file/directory selection window. To quit, click the Close button.



How STL File Optimization Works

Facets in most STL files are listed randomly. The STL Optimization Utility sorts the facets into an order that can be used by the Build Setup application to speed loading and display. It also removes unnecessary facets (facets that provide levels of details that cannot be reproduced in the SLS system) and combines some facets to reduce the file size and load times.

 Although it may take several minutes to optimize a large STL file, the task only needs to be performed once. Also, you can optimize whole directories of STL files as a batch process, overnight or during other available down time.



Chapter 8

RealMonitor and RealMonitor Viewer

This section describes RealMonitor and RealMonitor Viewer, two related applications which allow you to collect and review data about your system. These applications replace the Remote Diagnostic application, handling all of its functions and providing additional ones.

With RealMonitor, you can choose when to log system data, and see live graphs and comparisons of system parameters while your SLS system operates. After a build, use RealMonitor Viewer to examine and analyze the data logged by RealMonitor. This section includes the following topics:

- [Licenses for the Applications](#)
- [Starting the Applications](#)
- [Logging Data with RealMonitor](#)
- [Comparing Parameters in Either Application](#)
- [Zooming in X and Y](#)
- [Setting the Y Scale Range](#)
- [Printing Plots](#)
- [Preferences](#)
- [Reviewing Logged Data with Real Monitor Viewer](#)



Licenses for the Applications

RealMonitor and RealMonitor Viewer are licensed applications. You need a license to make full use of either application, however, you can log diagnostic data about your system with RealMonitor before you install a license. You cannot view the data without a license, but a 3D Systems technician can analyze it, and you can send the logged data to 3D Systems for help in resolving a problem.

Only one license is required for these paired applications; installing a license for either application provides the same level of license for the other application.

Installing a License

If you launch RealMonitor Viewer without a valid license installed, the licensing dialog box appears. Or you can click the Enable button in RealMonitor to display it. You can also upgrade your license at any time by clicking the Enable button in either application.

Click to
enable a
license

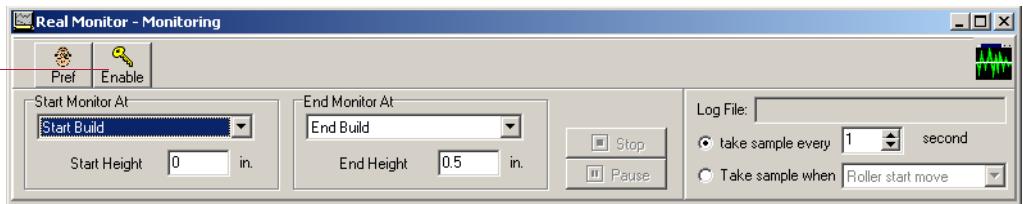


Figure 35. RealMonitor, Before Enabling a License



The application displays a dialog box with your computer's identification code. Contact 3D Systems as directed in the dialog box and provide your code. 3D Systems Customer Support will provide you with a license password specific to your system. Enter the license password in the license dialog box.

License Types

Several types of licenses are available for the RealMonitor and RealMonitor Viewer applications.

- The Default license, which comes with the software, allows your system to log data but not view it. 3D Systems personnel can still retrieve and analyze data logged in this manner.
- A Basic license allows you to log data and view it in real time, as well as view saved monitoring data.
- An Advanced license has the capabilities of the Basic license, and also allows you to export data to a delimited file, as well as use a dynamic-link library (DLL) to access the logged data in real time from a custom application program.

Replacing Licenses

The license password will persist after an upgrade of the SLS system software. However, you will need to contact 3D Systems Customer Support to get a new password if you do either of the following:

- Reinstall your operating system
- Change your network configuration; (for example, if you replace your network card)



Starting the Applications

RealMonitor cannot be started or stopped on its own; instead, it starts and stops automatically with the Sinter application.

You can start RealMonitor Viewer by clicking the RealMonitor Viewer shortcut in the SLS System folder on your Start menu. You can run RealMonitor Viewer while Sinter and RealMonitor are running, and you can run multiple copies of RealMonitor Viewer.

Logging Data with RealMonitor

RealMonitor does not track your system all the time. Two boxes underneath the RealMonitor toolbar offer options for starting and ending monitoring.

The application defaults to starting monitoring at the beginning of a build and ending it when the build is over. It returns to these settings when you end a build or restart the Sinter application, so that RealMonitor always monitors each new build unless you specifically change its settings.

The other start options include:

- Manual, which enables the Start button; click it when you want to start monitoring.
- Beginning of build stage
- Beginning of cool down stage
- Specified warm up height
- Specified build height

Similar options exist for ending monitoring.



Comparing Parameters in Either Application

The two diagnostic applications display similar graphs, allowing you to view and compare machine parameters over time. For each parameter section, you can select a parameter in the Plot Parameter list. The system graphs the parameter to the right.

 If you want to view more than two parameters with RealMonitor Viewer, you can launch an additional copy of the application, load the same log file, but select different parameters to view in it.

Parameter Graphs

Parameter graphs within the applications show a variety of data about a build.

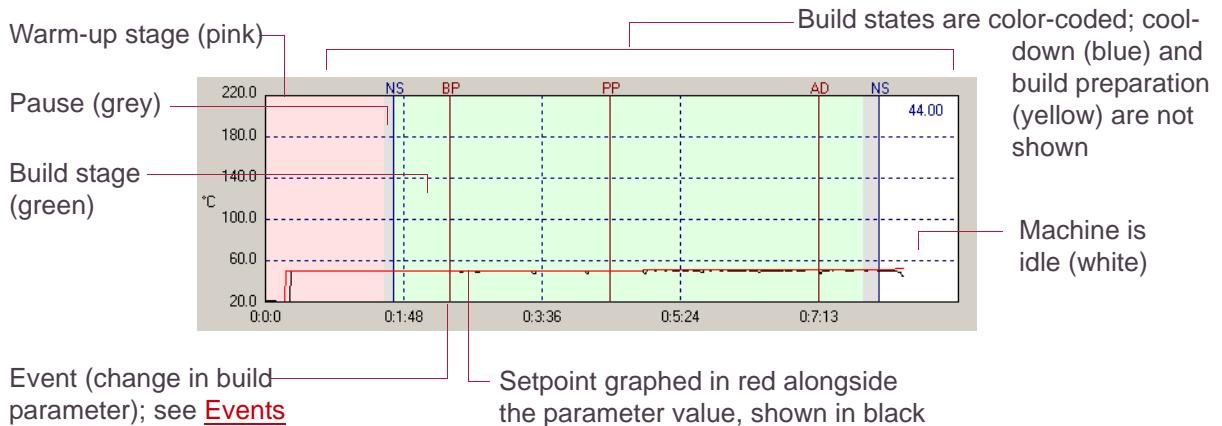


Figure 36. Sample Parameter Graph



Events

RealMonitor tracks a number of events during a build. Events are marked with a vertical line, and an abbreviation (above the line). The line and abbreviation are also color coded. The following table shows the monitored events:

Abbreviation	Event	Description
PM	Pause Monitor	Monitoring was paused.
SR	Sample Rate	The sampling rate was changed by the user.
BP	Build Parameter	A build parameter was manually adjusted.
PP	Part Parameter	A part parameter was manually adjusted.
BM	Build Mode	The build mode was manually adjusted
AD	Add/Delete Parts	Parts were manually added or deleted
PC	Prime Cycle	A prime cycle was run.
NS	Next Stage	The system was manually directed to move to the next stage of the build.
TM	Terminate	The build was manually terminated.
AL	Alarm	A system alarm occurred.
R1	Calibration on	The system began real-time calibration.
R0	Calibration off	The system stopped real-time calibration.
RA	Real-time adjustment	A calibration adjustment occurred.



Zooming in X and Y

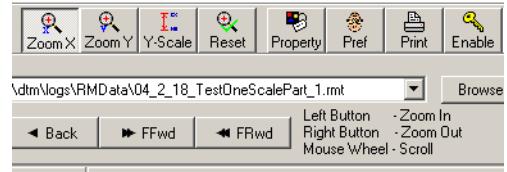
In either application, you can change the visible portion of either of the two graphs displayed in the window by clicking the Zoom X or Zoom Y buttons.

After clicking Zoom X or Zoom Y, use the left and right mouse buttons to zoom in and out.

The zooming action is centered on the region of the graph where you click your pointer.

Use the mouse wheel, if available, to scroll within the graph. If you place the mouse inside the plot, the graph is scrolled on the X axis. Placing the mouse on the left side of the plot allows you to scroll in the Y axis.

Click the Reset button to return to the original zoom settings.



Setting the Y Scale Range

Click the Y-Scale button to display a dialog box with fields for minimum and maximum values of the Y axis for either graph.

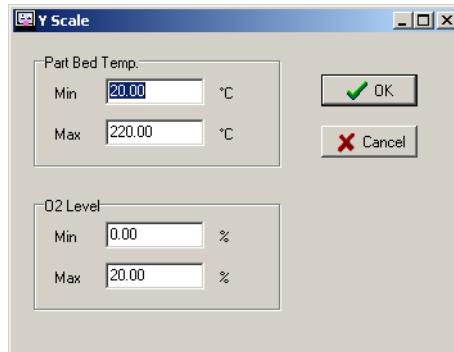


Figure 37. Y Scale Dialog Box

Printing Plots

Click the Print button in either application to display a dialog box of printing options. The system prints the two current graphs to the printer you select.

Preferences

The two applications have similar but separate preference options. Click the Pref button in either application to display a preferences dialog box.

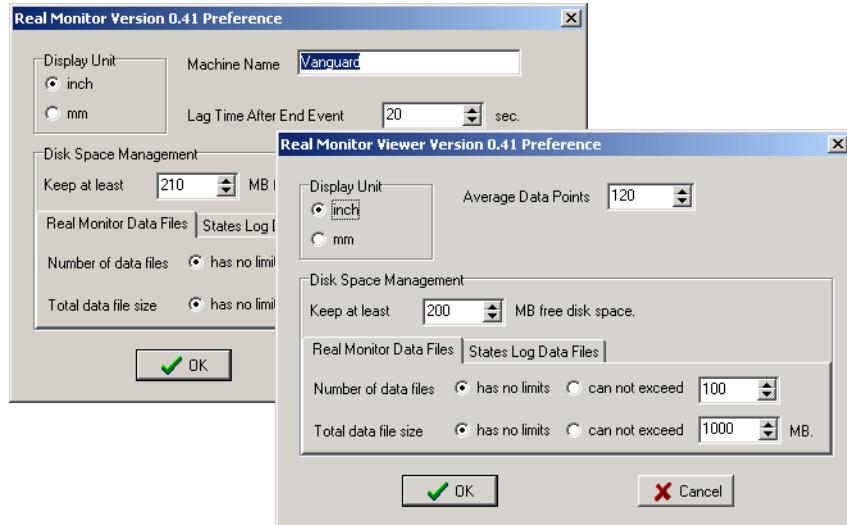


Figure 38. Preferences in RealMonitor/RealMonitor Viewer

In either application, you can use the preferences dialog box to:

- Change the display unit (inches or millimeters)
- Set data file limits for both RealMonitor data and States.blog data, in terms of available disk space, number of data files used, and total data file size.

RealMonitor Options

Machine Name: This field determines the machine name that will be written to the log file. The default value for this name is taken from the SLS system configuration files; if this name does not reflect the name you use to identify your machine, edit the field.



Lag Time After End Event: Sets how long RealMonitor continues logging after a build is complete.

RealMonitor Viewer Options

Average Data Points: When you display pinpoint data with RealMonitor Viewer, it displays an average value for the point, created by averaging the point with as many preceding points as are specified by this value. See [Viewing Pinpoint Data](#) for more information.

Reviewing Logged Data with Real Monitor Viewer

Use RealMonitor Viewer to view log files (.rmt files) generated by RealMonitor from past builds. RealMonitor Viewer has additional features for viewing data that are not available in RealMonitor.

Loading a RealMonitor Log File

Click the Browse button to display a standard Windows file-opening dialog box, and use it to open a RealMonitor log file to examine with RealMonitor Viewer. By default, RealMonitor data files are stored in the \dtm\logs\RMDData folder.

 Most of RealMonitor Viewer's buttons remain inactive until you load a log file.

Basic build packet and machine information for the selected log file

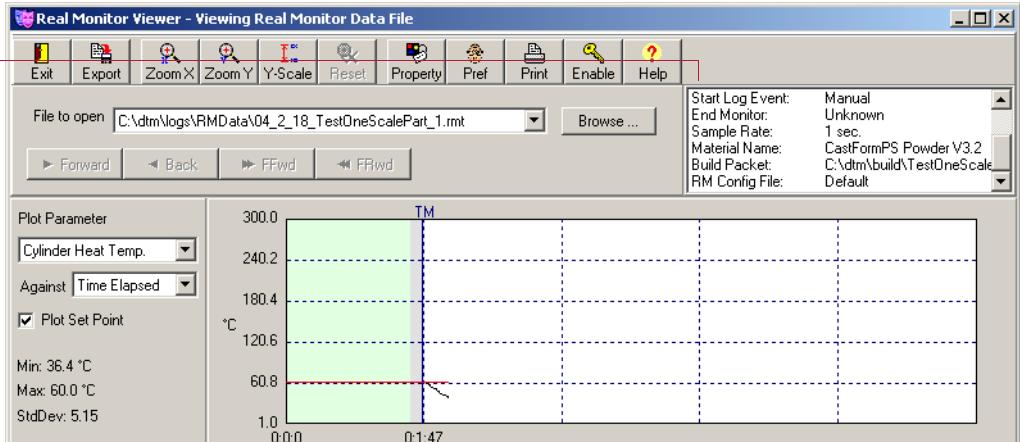


Figure 39. RealMonitor Viewer Window

Viewing Pinpoint Data

To get more specific information about a point on the RealMonitor Viewer graph, hover your mouse pointer over the point, or click on the point:

- When you pause your mouse pointer over a point on the plotted graph, information about the data point appears in a pop up window, including its value (y), time (x), stage height and set point, as well as an average value created by averaging the current point with some number of preceding points (defined by the Average Data Points preference option). If an event is associated with the data point, the event description also appears.



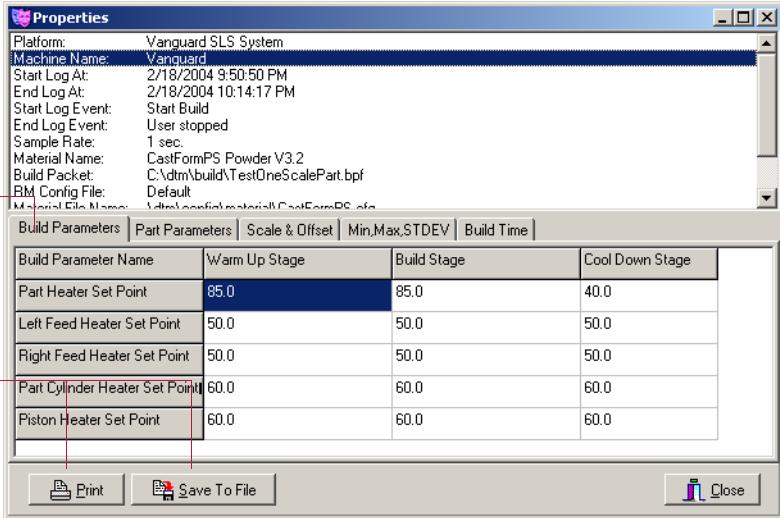
- When you click on a point on the curve, green horizontal and vertical lines pinpoint your location, and the application displays a popup window with information about the selected point. When you have selected a point in this way, you can move the selection forward or backward through the graph with the arrow keys on your keyboard.

Displaying Build Properties

Click the Property button in RealMonitor Viewer to display a dialog box with information about the build whose data you are viewing. Basic information such as the platform, machine name, and material type is displayed at the top of the window, with details such as build and part parameters displayed in tabs at the bottom.

Click tabs to display different categories of information

Print the data or save it to a file



The Properties dialog box displays the following information:

Platform: Vanguard SLS System
Machine Name: Vanguard
Start Log At: 2/18/2004 9:50:50 PM
End Log At: 2/18/2004 10:14:17 PM
Start Log Event: Start Build
End Log Event: User stopped
Sample Rate: 1 sec.
Material Name: CastFormPS Powder V3.2
Build Packet: C:\ndm\build\TestOneScalePart.bpf
BM Config File: Default
Material File Name: \\dhs\conf\material\CastFormPS.sta

Build Parameters | Part Parameters | Scale & Offset | Min,Max,STDEV | Build Time

Build Parameter Name	Warm Up Stage	Build Stage	Cool Down Stage
Part Heater Set Point	85.0	85.0	40.0
Left Feed Heater Set Point	50.0	50.0	50.0
Right Feed Heater Set Point	50.0	50.0	50.0
Part Cylinder Heater Set Point	60.0	60.0	60.0
Piston Heater Set Point	60.0	60.0	60.0

Print Save To File Close

Figure 40. Properties Dialog Box



Exporting Data Files

If you have an Advanced license, you can export data when you are using RealMonitor Viewer. Click the Export button to save data from the current file to a text file.



Appendix A

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