TFX Head

Head Firmware Version 1.24 Release Notes

Document Number
717-00081A-B-PM01

2004-02-20

Creo Inc.
3700 Gilmore Way
Burnaby, BC
Canada V5G 4M1
(604) 451-2700

Copyright 2004 Creo Inc. All rights reserved.

Revision History

Revision	Date	Author	Comments
A	2/13/03	Amber Strocel	First draft.
B	6/12/03	Amber Strocel	Update bug fixes and version info.
C	2/17/04	Amber Strocel	Update for V1.24, and remove ProComm documentation.

creo

TFX Head
Head Firmware Version 1.24 Release Notes

CONTENTS

1. Scope and Introduction (Please Read) 1

2. Laser Safety Practices 1

3. Related Documents 1

4. Common Acronyms 2

5. Preliminary Checklist (complete before you begin) 3

6. Upgrade Procedure 4

7. PRM Changes 5

8. Bug Fixes 5

9. New Functionality 6
   - 9.1 CEH Interface 6
   - 9.2 Staggered Seams 6
   - 9.3 Velocity Power Curves 6
   - 9.4 Bi-directional Imaging 7

10. Appendix A: Service Shell Setup 9

11. Appendix B: Backing up and Restoring NVS Parameters 9
   - 11.1 What is the NVS? 9
   - 11.2 Backing up the NVS Parameters 9
   - 11.3 Restoring the NVS Parameters 9

12. Appendix C: Loading TFX Head Firmware 10
   - 12.1 Manually Loading Firmware using Service Shell 10
   - 12.2 Loading Firmware using FirmwareUpgrade.spt 10
   - 12.3 Recovering From Firmware Load Error 11

13. Appendix D: TFX Head Version Information 11

1. SCOPE AND INTRODUCTION (PLEASE READ)

This document :

- describes important changes to the TFX Head firmware that come with version 1.24.
- outlines procedures for upgrading head firmware.

Thermoflex® devices use both the MPE and MCE. The words 'MPE' or 'MCE' are used when listed commands apply to only one type of device. The generic word 'host' is used when listed commands and procedures apply to both the MPE and the MCE.

The appendices provide a reference guide for backing up and restoring NVS parameters as well as the procedure for loading TFX Head Firmware.

This document uses the following formatting conventions:

- TFX commands contained within procedures that are to be typed are in `Courier font` and are preceded by `TFX >`. Exceptions are commands contained in an explanation of a new feature. These commands are in **bold**.
- Host commands contained within procedures that are to be typed are in `Courier font` and are preceded by >>. Exceptions are commands contained in an explanation of a new feature. These commands are in **bold**.
- All nvs parameters are in *italics.*

2. LASER SAFETY PRACTICES

To use this document the FSE (Field Service Engineer) **must** have attended a Thermal introductory course given by the service-training department, the product specialist, or the engineering support team. The FSE must be familiar with the safety precautions when working with a Thermoflex device.

DANGER! Never operate the Thermoflex device with the write laser beam on and a door open. Do not use the service bypass jigs to bypass the door interlocks.

3. RELATED DOCUMENTS

- Firmware Commands and NVS Parameters, available at: **TechPlanet** > **Output** > **Heads** > **TFX Head** > **Control/settings** (http://techplanet.creo.com/output/heads/tfx/nav/control-set.htm)
- TFX Errors, available at: **TechPlanet** > **Output** > **Heads** > **TFX Head** > **Troubleshooting** (http://techplanet.creo.com/output/heads/tfx/nav/troubles.htm)
- Service Shell program, available at the Service Shell TechPlanet site: **TechPlanet** > **Output** > **Service Tools** > **Service Shell** > **Downloads** (http://techplanet.creo.com/output/service_tools/service_shell/nav/v2-x/downloads.htm)

- TFX Head homepage, available at: **TechPlanet** > **Output** > **Heads** > **TFX Head** (http://techplanet.creo.com/output/heads/tfx/nav/index.htm)
- Controlled Releases, available at: **TechPlanet** > **Output** > **All CTP Devices** > **Control/settings** (http://techplanet.creo.com/output/computer_to_plate/all_ctp/nav/control-set.htm)
- TFX Firmware Releases, available at: **TechPlanet** > **Output** > **Heads** > **TFX Head** > **Downloads** > **Firmware Releases** (http://techplanet.creo.com/firmware/ctp/Head/TFX/versions.htm)
- Escalations page, available at: **TechPlanet** > **Output** > **All CTP Devices** > **Escalations** (http://techplanet.creo.com/output/computer_to_plate/all_ctp/nav/escalate.htm)

4. COMMON ACRONYMS

MPE	Master Processor Electronics
MCE	Master Control Electronics
CEH	Creo Exposure Head
API	Application Program Interface
CTP	Computer to Plate
NVS	Non-Volatile-Storage
PRM	Head Non-Volatile Parameters

5. PRELIMINARY CHECKLIST (COMPLETE BEFORE YOU BEGIN)

☐ Have a terminal program running, with direct access to the diagnostic port on the TFX head. For information on properly configuring terminal programs, refer to Appendix A.

CAUTION: You cannot upgrade the TFX firmware using the redirect enable/disable feature.

☐ Type the following command in the host window:

```
>> list version
```

On MPE devices, record the following:

"MPE Firmware version": _____

On MCE devices, record the following:

"Version": _____

☐ Type the following command in the TFX window:

```
TFX > ver
```

Then record the following:

"Firmware": _____

"Build": _____

"Control board": _____

"Xilinx": _____

☐ **If you are performing a field upgrade to the TFX head firmware:** It is mandatory that the head firmware and the host firmware be synchronized. Upgrade the host code first, and then upgrade the TFX head firmware to a version compatible with the host firmware. To determine which firmware versions are compatible, refer to the controlled releases page (for details refer to the Related Documents section).

The upgrade procedure is as follows:

1. Upgrade host firmware (read all firmware release notes between versions to ensure you perform all necessary steps).
2. Reboot and ensure the system is functioning correctly.
3. Upgrade TFX head firmware (using this document).

☐ **If you are installing a new or replacement head:** It is mandatory that the TFX head firmware and the host firmware be synchronized. Prior to installing the head, the host firmware should be upgraded to a version that is compatible with the replacement head

firmware. To determine which firmware versions are compatible, refer to the controlled releases page (for details refer to the Related Documents section).

Note: If it is still not clear after reading the firmware release notes which device firmware versions may be skipped, call the Product Specialist for your output device model. Refer to the Escalation page for contact information (for details refer to the Related Documents section).

☐ Have the TFX Head firmware version 1.24.bin file available (HT123R2299.BIN).

☐ Ensure "Allegro™", "PrintConsole", and "Prinergy®" software is not running.

6. UPGRADE PROCEDURE

For download information for the TFX head firmware, refer to the Related Documents section.

1. **If any field upgrade is required**, upgrade the host firmware first**,** then upgrade the head firmware. For version information, refer to the output device site on Tech Planet.
2. Back up the head NVS using ProComm. Refer to Appendix B for the procedure.
3. Load the new firmware. Refer to Appendix C for the procedure.
4. Generate some test plots to ensure that plot quality has not noticeably degraded because of the upgrade.

7. PRM CHANGES

The following table details which head parameters have changed in this release.

NVS Parameter	Comment	Description	See Section
set foc *edgespotwidth*	added	New FOC parameter "edgespotwidth" added.	
set med *imagemode*	added	New MED parameter "imagemode" added.	
set sys *swidth*	removed	Read-only parameter "swidth" removed.	
set sys *soffset*	removed	Read-only parameter "soffset" removed.	
set vpc *velocity_points*	added	New VPC module added for sleeves.	9.3
set vpc *power_points*	added	New VPC module added for sleeves.	9.3

The following table details which system parameters have changed in this release.

Index	System Parameter	Comment	Read by Host	Written by Host	See Section
7	Surface Velocity	read from host	Yes	No	
8	Sensitivity	read from host	Yes	No	
9	Sensitivity Adjust	read from host	Yes	No	
33	Write Laser Enable	added	No	No	
34	Focus Learn Enable	added	Yes	No	
35	Bidirectional Flag	added	No	Yes	9.4
36	Seam Offset	added	No	Yes	9.2
37	Seam Width	added	No	Yes	9.2
38	Sleeve Flag	added	No	Yes	9.3
39	Carriage Speed	added	No	Yes	

8. BUG FIXES

- Fix failure of **foc gen lut** command in firmware version 1.23.
- Firmware version 1.14 checked the number of focus samples per swath, in order to ensure that each swath the minimum 35 focus samples required to actively focus. Shorter plots would fail. However, firmware version 1.24 allows plots with fewer than 35 focus samples.

  Version 1.24 firmware images these small plots are using held focus. The focus system calculates a single optimal lens position over the swath, and holds the lens in that position for the whole swath. This allows shorter plots to proceed without errors. However, for optimal plot quality, a minimum of 35 samples per swath is still required. For a 432 mm diameter drum spinning at 320 rpm, a 5" plot has at least 35 samples. For the same drum spinning at 440 rpm, a 6.5" plot has at least 35 samples.

- In previous firmware versions, the **analyze** command used 'ENTER' as the abort code. This created problems with some terminal utilities, such as Splot, which send 'ENTER' with every command. To prevent inadvertently aborting the **analyze** command, the abort code was changed to '#'.
- More focus error messages were added to allow easier debugging of the focus subsystem.
- In V1.14, the maximum SCLK frequency was 950 kHz. This limit was actually the limit for the thermal 2 head, and unnecessarily constrained TFX. To allow higher-speed image, the SCLK limit was increased to 1150 kHz.
- Fixed focus mismatch errors when imaging in gapless mode.

9. NEW FUNCTIONALITY

9.1 CEH Interface

Today, Creo produces several types of exposure heads, used with several hosts. Because each head type can be used with multiple host types, and vice versa, it is increasingly important that we have a standard application program interface (API) for all Creo exposure heads and hosts. This API provides a uniform set of functions, which any host can use to access and control the exposure head.

TFX head firmware version 1.14 contained a version of CEH that implemented the new functionality inside the head, and updated the TFX interface for the user. However, the interface to the host used the old command structure and messaging conventions. Thus, version 1.14 only represents the first step in implementing CEH.

The completed CEH API is present in TFX head firmware version 1.24. The head interface that the user sees is largely unchanged from V1.14. However, the way that the head is accessed through the MCE has changed substantially. The most significant change that the user will see is that the head parameters (*head*, *hdm*, *hdp*) will no longer be present in the MCE interface. All head parameters must be accessed either through the head serial port, or using **redirect enable**.

The MPE does not implement the updated API for CEH. This means that the head parameters will remain accessible through both the MPE interface and head interface on MPE devices.

9.2 Staggered Seams

Some sleeve engines use staggered-seam media, which require special functionality in the head. In order to image staggered seam media, changes were made to the focus module, and two system parameters were added. The system parameters, *Seam Offset* and *Seam Width*, are sent to the head by the host. By knowing the seam position and seam width, the head can properly focus across the whole media, and we can image on staggered seams.

9.3 Velocity Power Curves

On sleeve machines, the surface velocity is not held constant on all sleeves. Surface velocity changes with diameter, even when using the same media. However, in order to ensure that the

exposure for each media stays constant, we need to keep the ratio between power and surface velocity constant.

The velocity power curves are used on all sleeve images. The host sets the system parameter *Sleeve Flag* to TRUE when imaging on a sleeve. A TRUE setting indicates that the head should use the power settings in the velocity power curve, rather than the MED *stroke* parameter, as the diode target power.

The velocity power curves are calibrated to keep exposure constant even as surface velocity changes. The curves, which are defined for each media, contain an array of surface velocities and their corresponding diode powers. The velocity points are contained in the VPC *<media index> velocity_points* array, and are in units of m/s. The power points are contained in the VPC *<media index> power_points* array, and are in units of mW.

When the *Sleeve Flag* system parameter is set to TRUE, the sleeve engine sends the drum speed to the head, and the head calculates the equivalent surface velocity. Then the head searches for the appropriate diode power in the velocity power curves by interpolating between points, or extrapolating for surface velocities greater than the highest velocity point.

In order to ensure that the power settings generated by the head are correct, there are some rules when setting up velocity power curves. First, the head cannot find power settings for surface velocities lower than the lowest velocity point, so the minimum velocity point should correspond to the minimum surface velocity used by the device. Second, the first velocity point in the array must be non-zero, there must be at least two velocity points, and the velocity points must increase in value. Any zero velocity points at the end are disregarded. Third, each velocity point must have a corresponding power point. Finally, none of the velocity or power points can exceed the operating limits of the head.

To set velocity points for a given media, type:

```
TFX > vpc velocity <media index> <point1> <point2> … [<point7>]
```

To set power points for a given media, type:

```
TFX > vpc power <media index> <point1> <point2> … [<point7>]
```

To check the velocity points for a given media, type:

```
TFX > vpc velocity <media index>
```

To check the power points for a given media, type:

```
TFX > vpc power <media index>
```

To find the power setting for a given velocity, in the current media, type:

```
TFX > vpc point <surface velocity>
```

9.4 Bi-directional Imaging

Bi-directional imaging is not currently used with TFX. However, bi-directional functionality is available in the TFX head should any applications arise which require it. The host uses the *Bidirectional Flag* system parameter to control bi-directional imaging.

10. APPENDIX A: SERVICE SHELL SETUP

ServiceShell version 2.4 or higher is required for the TFX head. ServiceShell is the preferred terminal utility for most applications on the TFX head.

Information on ServiceShell, including downloads, is available on the ServiceShell page on TechPlanet (for details refer to the Related Documents section).

11. APPENDIX B: BACKING UP AND RESTORING NVS PARAMETERS

Before upgrading the firmware of any machine, it is important to backup the current head parameters in case it becomes necessary to revert to the previously installed version of firmware.

11.1 What is the NVS?

The NVS provides storage for machine-dependent parameters that must remain intact between power cycles.

Saving individual NVS parameters is automatic in the TFX Head. Whenever a parameter is changed, it is updated in the head parameter subsystem.

11.2 Backing up the NVS Parameters

We back up NVS parameters by creating a baseline in the head. Later, we can compare our NVS settings, and restore the baseline settings, if required. To create a baseline, type:

```
TFX > prm save
```

It is also helpful to have a readable copy of the head parameters archived. To display all of the parameters on the monitor, type:

```
TFX > prm dump
```

11.3 Restoring the NVS Parameters

If the head NVS parameters are corrupted, it may be necessary to restore them. To restore the parameters, complete the following steps.

1. Type:

   ```
   TFX > prm diff
   ```

   This will display the changes made in the NVS since the baseline was established. Look closely at the differences and see if you can spot the problem. If you can, make the necessary changes.

2. To restore all parameters to their baseline settings, type:

   ```
   TFX > prm restore
   ```

12. APPENDIX C: LOADING TFX HEAD FIRMWARE

WARNING: Do NOT load head firmware via the host using `redirect enable`. This will cause the machine to crash and the firmware will not load successfully.

You can load TFX firmware using ServiceShell. Refer to Appendix A for information on how to set up these utilities.

12.1 Manually Loading Firmware using Service Shell

Service Shell version 2.4 or higher is required for loading TFX firmware. When using ServiceShell, the ht124r2299.bin file **must** be on a local drive, and the name **must not** be changed. Follow these steps to load TFX firmware using Service Shell:

1. Ensure that you have access to the diagnostic port on the TFX head and that the terminal program is running correctly. For more detailed instructions on the terminal program, refer to the ServiceShell page on TechPlanet (for details refer to the Related Documents section).
2. Back up the head NVS parameters following the procedure in Appendix B.
3. Load the firmware bundle by typing:

   ```
   TFX > download <filename>
   ```

   Note that <filename> must contain the full path and filename of the .bin file.
4. Repeat step 2 until you have uploaded the firmware successfully. Do not reset the head, as this will result in a non-functioning head. Reloading the firmware will be much more difficult.

12.2 Loading Firmware using FirmwareUpgrade.spt

You can automatically upgrade all firmware components at once using the FirmwareUpgrade.spt script. This script will perform all necessary backups, providing a simple downgrade path if that becomes necessary.

For detailed information on FirmwareUpgrade.spt, right-click on the script name in Service Shell (as below), or refer to the d:\ServiceShell\scripts\device folder on your computer. In order to upgrade TFX firmware, you need FirmwareUpgrade.spt version 3.45 or higher.



Follow these steps to load TFX firmware using FirmwareUpgrade.spt:

1. In Service Shell, load FirmwareUpgrade.spt, found under the 'Device' tab.

2. Execute this script. This script will upgrade all device code to the latest version, including head firmware, as the user chooses.

12.3 Recovering From Firmware Load Error

If a problem occurs during a firmware load and the head stops communicating through the serial port, the firmware will need to be reloaded using the head bootstrap. In order to load the firmware using the bootstrap, follow these steps:

1. Open a host terminal window using the procedure outlined in Appendix A.
2. On an MPE device, ensure that the *head type* parameter is set to 2. On an MCE device, ensure that the *hmgr type* parameter is set to 2.
3. Prepare to load the head firmware by typing:

   ```
   >> head program
   ```

   Wait for the host to respond with:

   ```
   Head Data link: exposure head coming online
   ```

   This will take roughly 30 seconds.
4. Enable the bootstrap by typing:

   ```
   >> head boot
   ```

   Wait for the host to respond with:

   ```
   EH Boot Command Complete
   ```

   This will take several minutes.
5. Ensure that the bootstrap is functioning in the head window. Check for the '`SBT>`' prompt to make sure.
6. Once the bootstrap is functioning, you can load the firmware using the standard procedure outlined in the previous section.
7. After the load has successfully completed, reset the head from the MPE by typing:

   ```
   >> head end
   >> reset
   ```

13. APPENDIX D: TFX HEAD VERSION INFORMATION

The following table lists the TFX Head firmware versions, along with any relevant data. Version entries displayed in **bold** are the supported releases.

TFX Head Firmware Version	Build Number	Notes
0.50	1477	Pre-release version.
1.04	1568	First release of TFX Head Firmware.
1.14	1901	Updated API, support for high-power and gapless imaging.
1.23	2299	Updated to CEH, support for staggered seams and imaging on sleeves.
1.24	2299	Patch fix for bug in V1.23.