MODULE 12

Diagnostics, Maintenance, and Troubleshooting

Introduction

This module gives the students hands-on experience in the following areas:

- Running diagnostics, both locally and remotely
- Performing the preventive maintenance (PM) procedures that are Quantum specific
- Identifying the cause of the problem with image artifacts
- Troubleshooting

Students should be encouraged to discuss their experiences in the field. The classroom should be the place to share their good and bad experiences with troubleshooting. Each engineer can learn from the next. You could even build up a list of tips that they may have for each other regarding the troubleshooting process.

Estimated Time

6 hours

References

Diagnostics:
Diagnostics Self-Study Guide (part number 653-00121A)

http://techplanet.creo.com/output/computer_to_plate/lotem800/content/train/Diagnostics.pdf

Diagnostic software overview:
http://techplanet.creo.com/software_solutions/networking_os/remote_support/content/proced/Windows/JOIND/JOIND.htm

Planned Maintenance Procedure:
http://techplanet.creo.com/output/computer_to_plate/lotem800_ll/content/procedures/maintnace/l8002_pm.htm

Lotem 800 II Family Planned Maintenance Checklist:
http://techplanet.creo.com/output/computer_to_plate/lotem800_ll/content/documentation/653-00453A.doc

For comprehensive information about imaging artifacts:
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/documentation/Data_Path_Artifacts_1_2.pdf

Procedure for submitting an image artifact for analysis:
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/documentation/Submit_Artifact_Procedure.doc

For more information about the error "Dongle not found":
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/troubleshooting/l8qts_dongle_not_found.htm#step_1

Required Resources

Collect examples of plates with imaging artifacts for the students to analyze during the lesson on page 418

Handouts

Lotem 800 Q/II Family Planned Maintenance Checklist (part number 653-00453A)
(To be used during the lesson *Perform Preventive Maintenance* on page 397)

Why You Need to Know This

This module provides you with hands-on experience in diagnosing problems in the Lotem Quantum, preventing problems from occurring by performing regular preventive maintenance, analyzing case studies, and troubleshooting.

Lessons in This Module

slide 12-1

Lesson 1: Run Lotem Diagnostics

Lesson 2: Perform Preventive Maintenance

Lesson 3: Case Studies: Analyze and Correct Problematic Exposures

Lesson 4: Troubleshoot the Lotem Quantum

Lesson 1

Run Lotem Diagnostics

slide 12-2



Why You Need to Know This

Creo has developed software for the hardware to test whether the hardware is working, both at the manufacturing stage and at the machine level, when the machine is already in the field. This lesson is about the diagnostics software you can use on platesetters in the field.



What You Need to Know

- How to activate and run the diagnostic tool
- How to test the Lotem hardware and to interpret the results
- Troubleshooting with the diagnostics software

Instructor's Notes

This lesson should be mainly hands-on. Explain the interface while using the diagnostics application, and then make sure that the students perform the hands-on activity and understand the results.

Emphasize that the most updated information for the relevant version of the diagnostics can be found on the actual platesetters.
(**Readme.htm** file on **c:/lotem/diag**)



Note: To get the most updated information for the relevant diagnostics version, please consult the **Readme.htm** file for that version.
This file can be found on the Lotem, under **c:/lotem/diag.**

Activating the Diagnostics Tool

First time only (after installation):

Before using the diagnostics for the first time, the user needs to load the application and then close it. After this, the diagnostics can be loaded and used.

After installation of the Lotem Software Kit, two buttons appear on the desk top: the **Lotem application** button and the **Diagnostics** button. Before you can run the diagnostics, close the Lotem application.

Double-click the **Diagnostics** button and the software loads. Upon loading, the field engineer can immediately check both the type of Lotem machine that is being tested and the communication with the boards.



Note: The software asks the operator whether there is a plate in the Lotem. The dialog even includes buttons to open the doors to check the plate's position. If there is a plate, then the software automatically disables the relevant test for drum speed, etc.

Analyzing the Diagnostics Tool

Boards and Comp Levels

slide 12-3

Boards in the Lotem are developed with an infrastructure for testing. This infrastructure enables the field engineer to connect with any Lotem and run diagnostic software to determine the cause of a problem.

Most boards have a comp level. Tests are performed according to this level, as the level indicates any upgrades or changes that have been made to the board.

To view the comp level, there is no need to run a test. Simply click **View** in the menu bar along the top of the screen, and then click **Hardware configuration**.

Using this software is highly recommended during troubleshooting.

User Levels

slide 12-4

The diagnostics system supports three main user levels - **User**, **Service** and **Expert (Manufacture/Field)**. System behavior varies according to the current user level. The difference is mainly in the menu options available for each user and in the level of messaging.

The level can be chosen from the menu bar along the top of the screen. Select **Level**, and then select the required level:

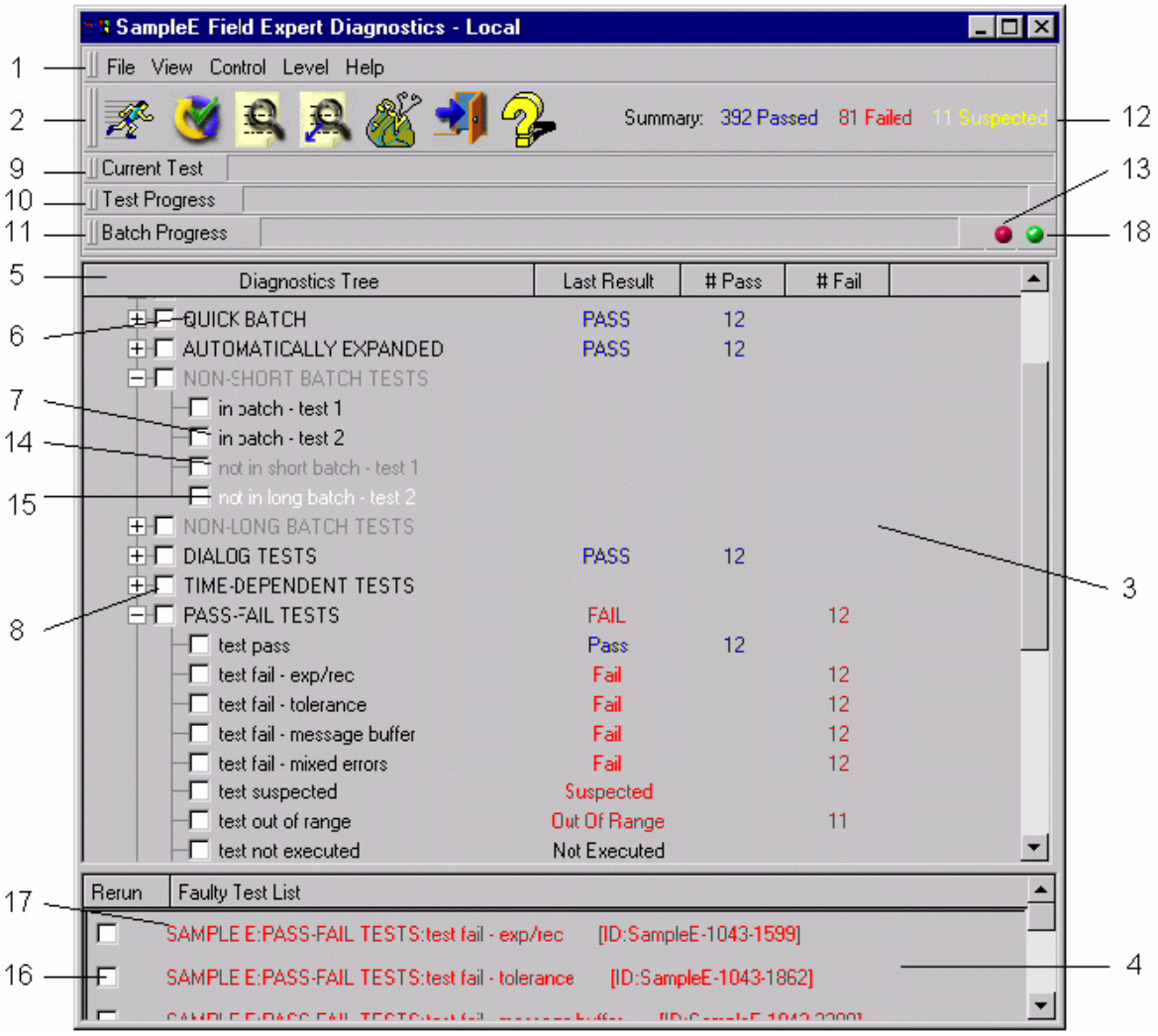
- The **User Level** operates on a test tree that indicates faulty FRUs (Field Replaceable Units).
- The **Expert Level** operates on an enhanced tree and reports detailed error messages that enables fault detection for even the lowest-level hardware components.
- The **Service Level** provides less detail than at the Expert Level, but more than at the User Level.

Although it is possible for any user to use the system at any level, we do not recommend doing so. Field needs are different from manufacturing needs. At all levels, the same hardware is tested, but the results are shown in different detail, depending on the level selected.

Understanding the User Interface

This section describes the Diagnostics Main Window, its various menus and their options. The numbers in the table following the illustration correspond to the numbers in the illustration.

slide 12-5



Name	Description
1. **Menu Bar**	Presents all operations that can be performed on the Test Tree.
2. **Button Bar**	Buttons for shortcuts to commonly used menu options. See *Shortcut buttons* on page 390 for an explanation of each button.
3. **Test Tree Window**	• Displays the hierarchical test tree of the device being tested. Each tested device has a unique test tree: – All upper-case letter names in the tree (6) are nodes that hold sub-topics. When checking a node with sub-topics, all the sub-topics are selected as well. – Lower-case names (7) are test entries that can be executed. A test is selected for execution by checking its check box (8). • Presents the results of test executions To actually run the selected set of tests, select **Run** from the **Control** menu (1), or click the **Run** shortcut button (2). Test results will be displayed under the Last Result column of the Test Tree Window (5). If the Loop flag is On, the number of pass and fail results will be summarized for each test.
4. **Faulty Test Window**	This window is initially empty. As tests are executed, a list of faulty tests is built up. This list can be used to: • Select a faulty test for rerunning (16) • View the description of the failure (17)
5. **Test Results**	The result of a test's last execution is shown under the Last Result column in the Test Tree Window (3). If the Loop flag is On, the # Pass and # Fail columns will also be filled, according to test results. The result of a node with sub-topics (6) is a summary of the sub-topics' results. • If all sub-topics passed, the summary is also a pass result. • If one or more of the sub-topics failed, the summary will give a fail result.
6. **Node Entry**	• Written in upper-case letters • Has sub-topics • If a Tree Node is selected for testing, all its sub-topics are also selected
7. **Test Entry**	• Represents a test • Written in lower-case letters • Has no sub-topics

Name	Description
8. **Test Check box**	Click this check box to select a node or test for execution. When the **Run** command is selected, all checked tests are executed.
9. **Current Test Name**	When a test is executed, its full name and location in the tree are displayed in the **Current Test Name** field.
10. **Test Progress Bar**	Indicates the progress of a single test.
11. **Batch Progress Bar**	Indicates the progress of the batch of tests.
12. **Test Result Summary**	A summary of the number of passed, failed and suspected results received so far for the batch or loop currently being executed.
13. **Batch Result LED**	Indicates whether all tests in the current batch passed, or whether a failure was detected. The colors indicate the following: • Yellow - initial color • Green - during a batch execution as long as the tests have passed so far • Red - a failure occurred
14. **Non-Batch Test (Default)**	A node (6) or test (7) colored gray indicates that, by default, it isn't included in a selected batch. However, after selecting the batch, it is possible to add this node/test to the batch.
15. **Non-Batch Test**	A test (7) colored white indicates that this test can never be included in a batch. This means that this test can only be executed by itself.
16. **Rerun check box**	Faulty tests can be selected for a rerun by checking the **Rerun** check box in the Faulty Test Window (4).
17. **Faulty Test Name**	The error description for a faulty test can be accessed by clicking on the name of the faulty test in the Faulty Test List of the Faulty Test Window (4).
18. **Startup Summary LED**	Indicates the success or failure of the JOIND startup process. • A green LED indicates a startup success. • A red LED indicates a failure, in which case it is possible to click the LED to receive a summary of the startup procedure.

Shortcut buttons

The following shortcut buttons are available for easier navigation:

Button	Name	Shortcut
	**Run**	To run the tests that have been selected in the check boxes.
	**Stop**	To stop a test running in loop or an executing batch of tests.
	**Wait**	Displayed after the **Stop** button is pressed until the current test is completed.
	**Errors**	Shortcut to the **Errors** command.
	**Quick Error**	Enables quick access to the error buffer of a selected test.
	**Loop Off**	Shortcut to the **Loop Until Abort** command, for toggling the button to **Loop On**.
	**Loop On**	Shortcut to the **Loop Off** command, for toggling the button to **Loop Off**.
	**Assistance**	Shortcut to the **Assistance** command.
	**Load Symptom**	Shortcut to the **Load Symptom** command. You can select a symptom from a predefined set of symptoms describing possible faults or problems in the tested device.
	**Exit**	To exit the software.
	**Help**	To select specific menu options or tree nodes when help is required.

Using Diagnostics to Test the Hardware

slide 12-6

Main Components

After activating the software, all information is read from the registry and automatically affects the tree structure accordingly:

There are three levels of tests that can be performed using the diagnostics kit:

1. **Power supply** - E-box, D-box. (The L-box does not have the necessary infrastructure, so it cannot be tested)
2. **Boards**
   These tests can be performed with the doors open (24 V cheater in place).
3. **Machine system** (motors, punch system, loading system, expose system, and unloading system). These tests must be performed with the doors closed.

Note: If the doors are open and the 24 V cheater is in place, then the system sends a safety warning message. If the engineer chooses to ignore the message, then the test can be run. The assumption being that the engineer is an expert user.

Highlights and Tips

slide 12-7

- To find out about a certain test, drag the  to a test to see the test's explanation.
- To run a set of tests, select their check boxes in the tree and click the  button.
- Log files may be opened and saved for statistical analysis.
- When there is a failure, the software will list the errors together with hints as to how to fix the error.
- Users can look for symptoms in the software:
  Use the **Load Symptom** option to select a symptom from a predefined set of symptoms describing possible faults or problems in the tested device. A list of possible actions to solve to problem will be displayed. For some of the symptoms, a set of tests will be automatically selected in the test tree. This set can be run for verifying the hardware connected to the specified symptom.

For more information about running diagnostics:
Diagnostics Self-Study Guide (part number 653-00121A) or, on TechPlanet:
http://techplanet.creo.com/output/computer_to_plate/lotem800/content/train/Diagnostics.pdf

Instructor's Notes

Before starting this activity, disconnect one of the following connectors:

- X-motor connector
- Y-motor connector

If there are 2 platesetters in the class, then disconnect a different connector in each machine.

Once the platesetters have been "set up", ask the students to perform the activity below.



Apply What You Know

slide 12-8

Activity: Run Lotem Diagnostics

1. Your instructor has "sabotaged" the platesetters in the class. The loading system does not work.
2. Run the diagnostic tests on the loading system, and see whether it helps you to diagnose the problem.
3. Results of the test on the loading system:

   _____

   _____

   _____

   Answer: The diagnostic test should point to an error with the connector that you have disconnected.
4. Which test gave you the diagnosis?

   _____

   _____

   Answer: X-motor was disconnected: the "Accuracy" test; Y-motor was disconnected: the "Home Position" test.
5. Fix the problem.
6. Discuss the results with your instructor.

Running Diagnostics over the TCP/IP

slide 12-9

JOIND- Java Over the Internet Diagnostics



Note: Remote Support is discussed in depth in the module *Remote Support* on page 297.

The **JOIND** - **J**ava **O**ver the **I**nter**n**et **D**iagnostics - is a Creo client/server diagnostics controller that runs locally or over a TCP/IP connection. It is an online diagnostic tool for running tests on local and remote nodes connected over the Internet or by a modem. JOIND runs under a Windows platform (NT/98/95), and can be used for local and remote diagnostic testing of Creo products.

JOIND Components

The JOIND system is comprised of three main components:

A Client Component

The JOIND Client is executed on the client computer over a Java Virtual Machine (JVM). It is the front end of the JOIND system, and it passes user requests to the JOIND Server, which may be located on the same PC, or on a remote computer that is being diagnosed.

A Server Component

The JOIND Server, JServer, is executed over the Java Virtual Machine (JVM) on the remote computer (for example, the Lotem) that is being diagnosed. JServer negotiates between client requests and the required diagnostic application on the server (remote) computer. It is not necessary to activate JServer when running diagnostics locally.

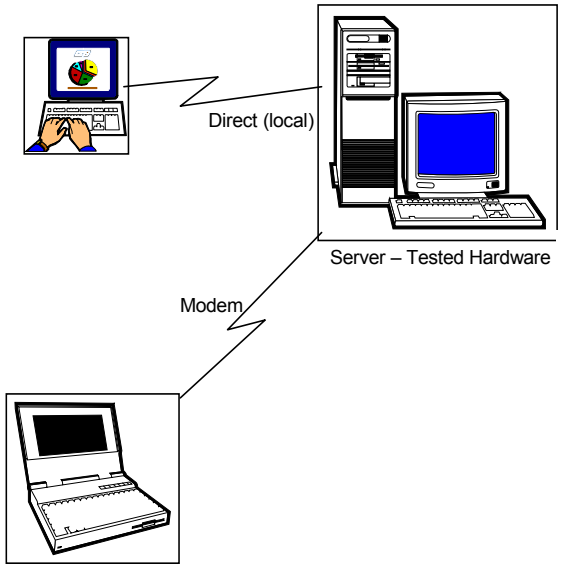
Diagnostic Applications

The Diagnostic Applications are located on the Creo platform, the server. The application(s) receive and execute test requests and return appropriate status responses.

JOIND Activation Modes

The JOIND Client is installed at the same time as the Lotem is installed. All the user has to do is double-click the JOIND icon on the desktop.

slide 12-10



slide 12-11

The JOIND may be activated in one of the following modes:

1. **Locally** - a JOIND local session does not require connection to other computers
2. **Over the modem** - both sides of the connection work through a modem. The client PC dials to a modem located at the customer site. Once the dialup connection is established, the JOIND Server must be activated on the server (the tested hardware) side, by running the **JServer.bat** which can be found in the **Start > Programs > Diagnostics** group.

Note: Activation of the server side will be upon a specific request by telephone, to an administrator or operator located on site.

For more information about JOIND activation:
http://techplanet.creo.com/software_solutions/networking_os/remote_support/content/proced/Windows/JOIND/JOIND.htm#Activation

Lesson Summary

slide 12-12

After completing this lesson you should be able to:

- Describe the theory of the diagnostic software
- Understand the user interface
- Run tests on the hardware
- Troubleshoot using the diagnostics software
- Run diagnostics over the TCP/IP

Lesson 2 Perform Preventive Maintenance

slide 12-13



Why You Need to Know This

Preventive maintenance are procedures that should be performed regularly to prevent problems in the platesetter. In this lesson you will learn about the procedures that need to be performed on the Lotem Quantum.



What You Need to Know

- The benefits of performing regular preventive maintenance
- The maintenance procedures specific to the Lotem Quantum:
  - Becker XY vacuum pump (DT 4.8) maintenance
  - Dry drum vacuum pump (VT 4.40) maintenance
  - UDRC particulate filter maintenance
  - Oil kit maintenance
  - Intake air filter maintenance
  - Cooling system preventive maintenance

Instructor's Notes

This lesson is meant to provide the students with the hands-on experience needed to perform the procedures that are specific to the Lotem Quantum. If there is time available, it is recommended that you give them the opportunity to perform the procedures in class. If not, then at the very least, go over the procedures together, and discuss them.

Performing Regular Preventive Maintenance

slide 12-14

The objective of the planned preventive maintenance (PM) is to maximize uptime for the Lotem 800 II Family.

1. Follow the procedure outlined in the *Planned Maintenance Procedure* document on TechPlanet. This document MUST NOT be left at the customer

site! (A copy of this document appears in the appendix, see *Planned Maintenance Procedure* on page 493.)

slide 12-15

2. For each customer, print out the *Lotem 800 II Family Planned Maintenance Checklist* from TechPlanet. Perform the PM procedures, and make sure that the customer signs off after a PM session. This checklist is then left with the customer, to be kept with the platesetter.
3. Update this checklist each time you visit the customer.



Planned Maintenance Procedure:
http://techplanet.creo.com/output/computer_to_plate/lotem800_II/content/procedures/maintnace/l8002_pm.htm



Lotem 800 II Family Planned Maintenance Checklist: (or Handout)
http://techplanet.creo.com/output/computer_to_plate/lotem800_II/content/documentation/653-00453A.doc

Performing Procedures Specific to the Lotem Quantum

The procedures explained below are procedures performed only on the Lotem Quantum.

Instructor's Notes

These procedures should be explained well, and, it time permits, students should perform them.

Becker XY Vacuum Pump (DT 4.8)

slide 12-16

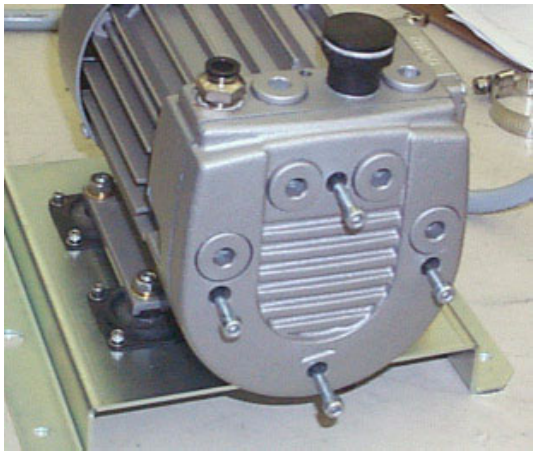
Preventive maintenance should be performed on the Becker XY Vacuum Pump (DT 4.8) every six months.

Tools Required

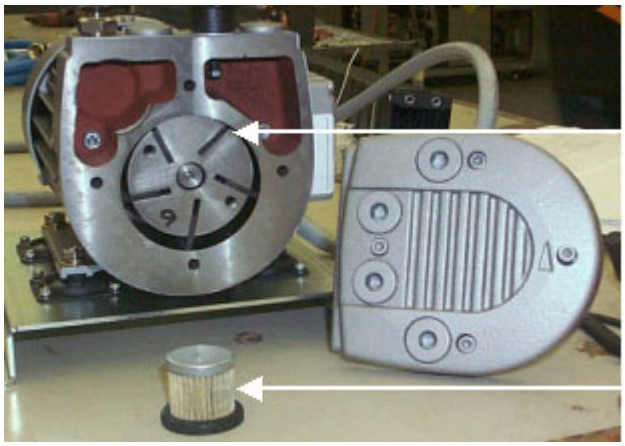
In addition to the standard tools, a 4 mm Allen® key is required.

Procedure for the maintenance of the Becker vacuum pump

1. Remove the distribution box panel.
2. Disassemble the vacuum pump cover by removing the four Allen screws.

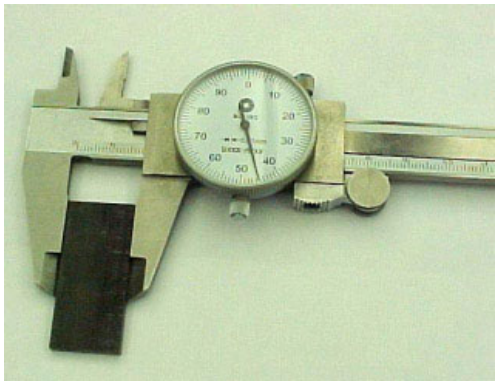


3. Remove the used filter and dispose of it.

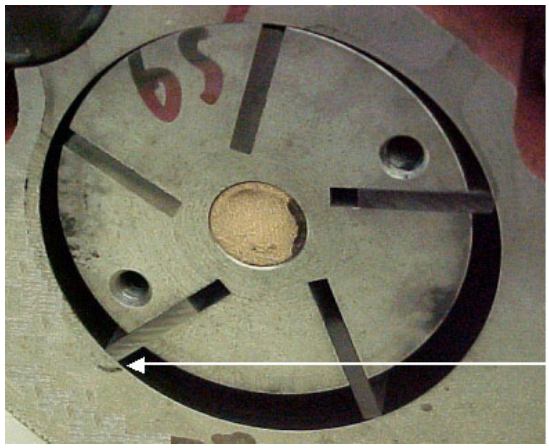


4. Remove the five blades.
5. Using an external air pressure hose, clean the inner areas of the vacuum pump.

6. Measure each vacuum pump blade with a caliber to check whether the blade has eroded. The width should be greater than 12.5 millimeters.



7. If the width of a vacuum pump blade is 12.5 millimeters or less, replace all the blades in the set with a new set (P/N 510K3R285).



Note: It is important to insert the vacuum pump blades with the curved side outward, fitting into the housing curve.

8. Insert a new filter (part number 342A10070).
9. Secure the vacuum pump cover by tightening the four Allen screws.
10. Reinstall the distribution box panel.

For latest version of the PM procedure for the Becker XY Vacuum Pump (DT 4.8):
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/procedures/maintnace/BeckerXYVacuumPumpDT.htm

Dry Drum Vacuum Pump (VT 4.40)

slide 12-17

Preventive maintenance should be performed on the dry drum vacuum pump (VT 4.40) every six months.

Tools Required

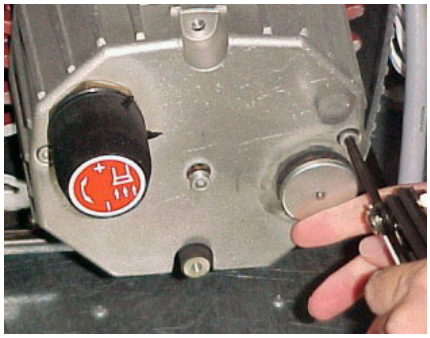
In addition to the standard tools, a 5 mm Allen® key is required.

Procedure for maintenance of the dry drum vacuum pump

1. Remove the distribution box panel.
2. Disassemble the dry drum vacuum pump polyurethane cover by removing the two Allen screws.



3. Disassemble the filter cover by removing the three 5 mm Allen screws.

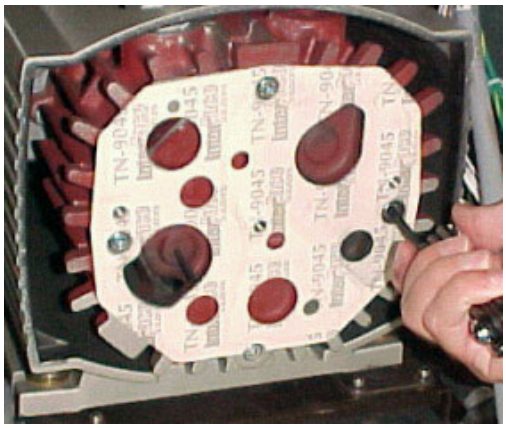


4. Replace the used filter with a new filter cartridge, and dispose of the used filter.

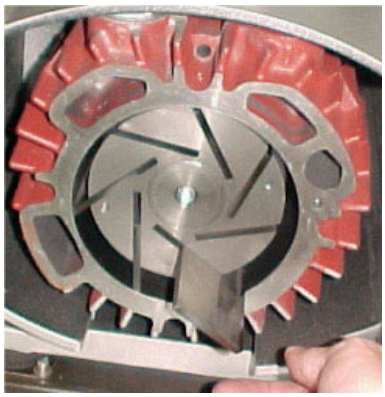


Filter cartridge (part number 342A10090)

5. To check the vacuum pump blades, remove the blades' cover by opening the four Allen screws.

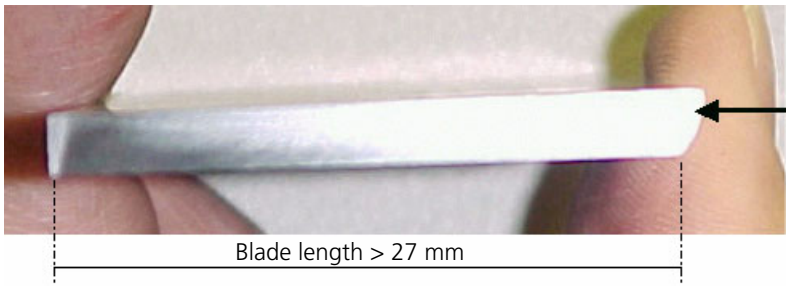


6. Pull out the seven vacuum pump blades one by one.
7. Using an external air pressure hose, clean the inner areas of the vacuum pump.

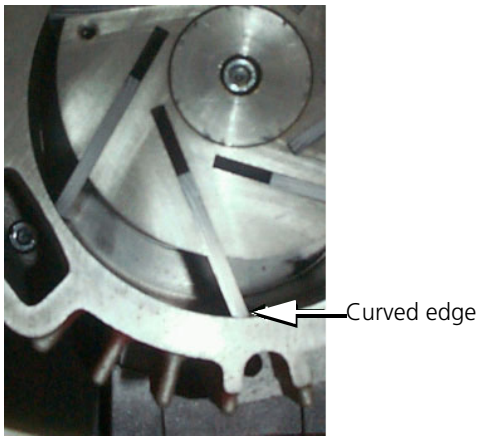


8. Measure the vacuum pump blades with a caliber. The width should be greater than 27 millimeters.

slide 12-18



9. If the width of any of the vacuum pump blades is less than 27 millimeters, replace all the blades in the set with a new set (part number 510K3R284).



Note: Insert the vacuum pump blades with the curved edge fitting into the housing curve.

10. Secure the blades cover by tightening the four Allen screws.
11. Secure the filter cover by tightening the three 5 mm Allen screws.
12. Secure the dry vacuum pump polyurethane cover by tightening the two Allen screws.
13. Reinstall the distribution box panel.

For latest version of the PM procedure for the dry drum vacuum pump VT 4.40:
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/procedures/maintnace/DryDrumVacuumPump.htm

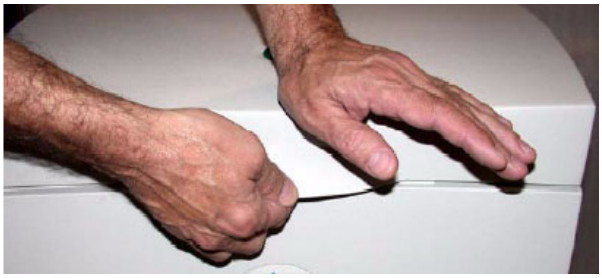
UDRC Particulate Filter Maintenance

The UDRC particulate filter should be replaced as required, every 6 months, or every 10,000 m^2 of plate.

Procedure to replace the particulate filter

slide 12-19

1. Ensure that your output device is not imaging a plate or film, and the power indicator light is off.
2. Open the cabinet lid by pressing down with the heel of your hand while releasing the latch with your fingers.



3. Remove the used particulate filter by lifting the filter straight up using the two D-rings.



Note: The hole in the top of the filter can have a very sharp edge. If you lift the filter using this hole, you may cut your fingers.

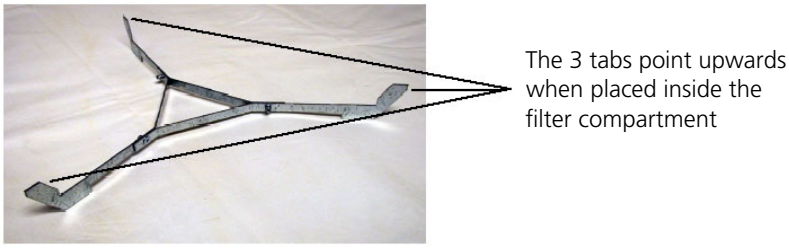
4. Place the used filter in a bag for disposal.
5. Clean the interior of the UDRC filter compartment:
   a. Remove the particulate filter spacer from the bottom of the filter compartment.
   b. Wipe the interior surface of the filter compartment with clean rags dampened with water and mild detergent.

c. Remove all residue by wiping thoroughly with a clean, damp rag.

d. Wipe the inside of the inner lid and the deck.

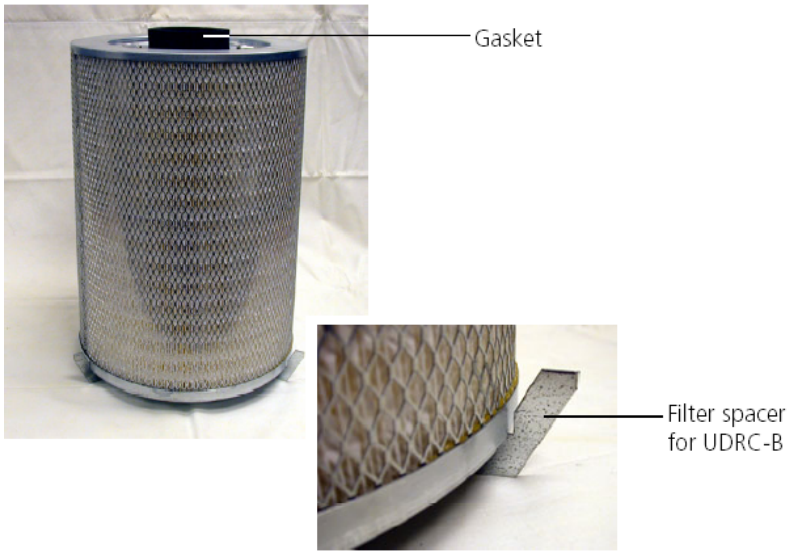
Danger: Do not let water run into the UDRC. This can result in serious personal injury or death from electrical shock, as well as damage to the equipment.

6. Reinstall the particulate filter spacer. Orient the filter spacer as shown in the diagram on the right.



7. Install the new particulate filter in the filter compartment with the gasket facing up.

   Ensure that the filter is fully seated on the particulate filter spacer. The spacer centers the filter inside the filter compartment, as shown in the diagram on the right.



Particulate filter correctly seated on the spacer

Note: When replacing filters, be careful not to bang the filter against the upper edge of the compartment. Damage to the edge can cause an air leak from the outside into the compartment, reducing the flow from the debris collection nozzle. Depending on the extent of the air leak, filter life will be reduced and a low flow error message may appear on your workstation.

8. Close the cabinet lid by pressing down on it until you hear a click.
9. Wash your hands.



For latest version of the PM procedure for the UDRC: (See Chapter 4, page 32)
http://techplanet.creo.com/idoc/03/4200B/A/03-4200B-A-PM01.pdf

Oil Kit Maintenance

slide 12-20

- Oil kit maintenance should be performed every six months.
- Dispose of the used oil brackets.
- The silicon oil kit needed for preventive maintenance can be ordered separately.

Part Numbers

Oil Brackets (part number 291A5A397)

Oil (part number 480A10045)

Dispenser (part number 395D10242) (Supplied with the kit on site.)



Note: Do not use any other oil except the one mentioned in this document.

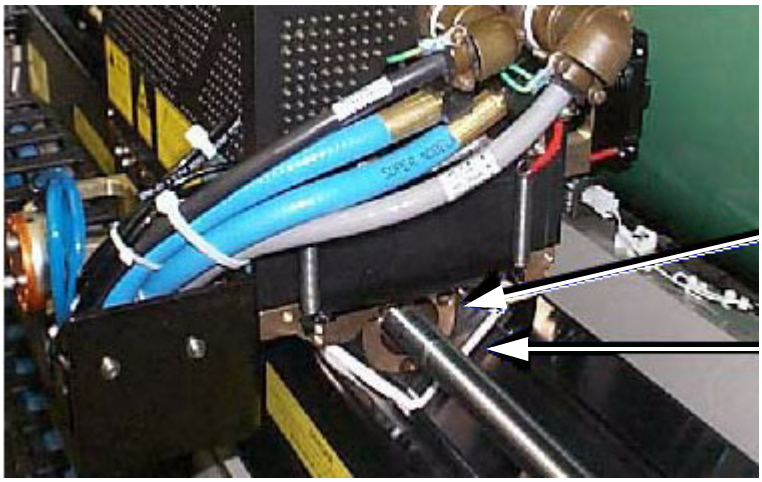


Note: For safety reasons, oil is not shipped with machines. Silicon oil must be ordered separately.

Procedure for oil kit maintenance

1. Open the rear upper door.
2. Disassemble the rear panel.
3. Send the carriage to the middle of the drum.
4. Disassemble the unload try.
5. Remove the two screws from both oil brackets.
6. Take out the oil brackets and dispose them.
7. Clean the surplus of oil and dirt before you assemble the new brackets.
8. Use the dispenser to apply 6 cc of oil to the new felt. The oil should be spread uniformly along the felt.

9. Assemble the new brackets. Before tightening the bracket screws, push the brackets downward lightly to allow the light preload of the felt. Be careful not to exert high force on the bracket, as it may affect the plate.



10. Move the carriage along the beam (at least once).
11. Assemble the unload try.
12. Assemble the rear panel.
13. Perform expose tests.
14. In case the of expose problems, lower the preload on the felt and then repeat expose tests.

For latest version of the PM procedure for oil kit maintenance
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/procedures/maintnace/oil_kit.htm

Intake Air Filter Maintenance

slide 12-21

The air intake pre-filter is located on the left side door. It should be replaced at least once every month. In dirtier environments, replace this filter more often.



Replacing the intake pre-filter

1. Open the Left side door of the machine.
2. Open 6 screws 8-32-3/8 and hold the air filter cover.
3. Lift the handles, located on the right and left side, half way up and pull them out.
4. Replace the air filter unit and assemble the new unit when the arrow marked on it faces the radiator side.



5. Assemble the handles and the air filter cover according to steps 2 and 3.

For latest version of the PM procedure for intake air filter maintenance
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/procedures/maintnace/intake.htm

Cooling System Preventive Maintenance

slide 12-22

Preventive maintenance should be performed on the cooling system every 6 months.

- Check that the strainer is free of debris, which implies that dirt is present in the coolant system, by following the **strainer preventive maintenance** procedure. If there is debris in the strainer, the color of the coolant may darken from pink to purple. This indicates that the pump may be worn and that debris entered the system. In this case, **drain the cooling liquid**, and replace all cooling system parts (pump, reservoir, hoses and radiator). Before assembling the parts, apply air pressure through the head to clean it. When assembling the cooling system, make sure that no debris enters the system, and then refill the reservoir with clean coolant.
- Check for leakage by touching the area under the pump. If the area under the pump is wet,**replace the pump** and reservoir, and then refill the reservoir with clean coolant.
- Check that the cooling system reservoir is full of liquid and that there is no leakage from the system by following the **cooling system pressure test** procedure.
- Check that the cooling system reservoir is not fractured and that there is no leakage from the connectors. If the reservoir is fractured or there is leakage from the connectors, perform the **cooling system pressure test** procedure.
- Make sure the water pump's motor is oiled on an annual basis as described in the **oiling the water pump's motor** procedure.



For latest version of the PM procedure for cooling system preventive maintenance
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/procedures/maintnace/CoolingSystem.htm

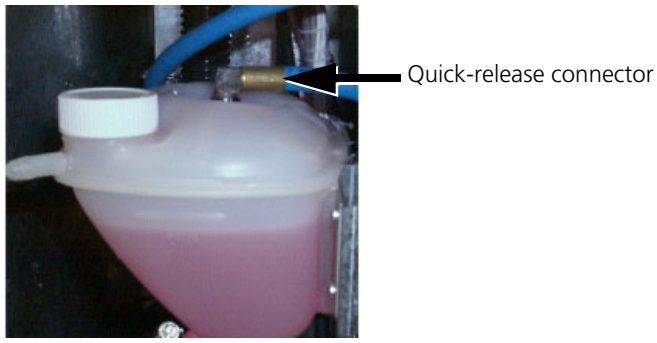
Strainer Preventive Maintenance

Debris in the strainer implies the presence of dirt in the cooling system. This preventive maintenance procedure describes how to check and clean the strainer.

To check and clean the strainer

1. Turn off the machine.
2. Remove the distribution box panel.

3. Release the quick-release connector.



4. Use the strainer jig to open the container plug.
5. Pull the strainer out.
6. Check that there is no dirt in the strainer.



Strainer jig



Strainer

7. If there is dirt in the strainer:
   - Clean the strainer, using the cooling liquid.
   - Check that the water pump is not worn out.
     If the pump is worn out, replace the water pump with a new one (part number 510P1P973).
8. Check whether the strainer is damaged.
   If the strainer is damaged, replace it with a new one (part number 299A1519A) by inserting the new strainer into the container plug.
9. Use the strainer jig to close the container plug.
10. Connect the quick-release connector (see step 3 above).
11. Assemble the distribution box panel.
12. Turn on the machine.

For latest version of the PM procedure for strainer preventive maintenance:
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/procedures/maintnace/StrainerPreventiveMaintenance.htm

Draining the Cooling Liquid

This document describes how to drain the cooling liquid when one of the cooling systems, including the head, is replaced.

Jigs



Knee jig



Draining tube jig

Jigs required for the draining cooling liquid procedure

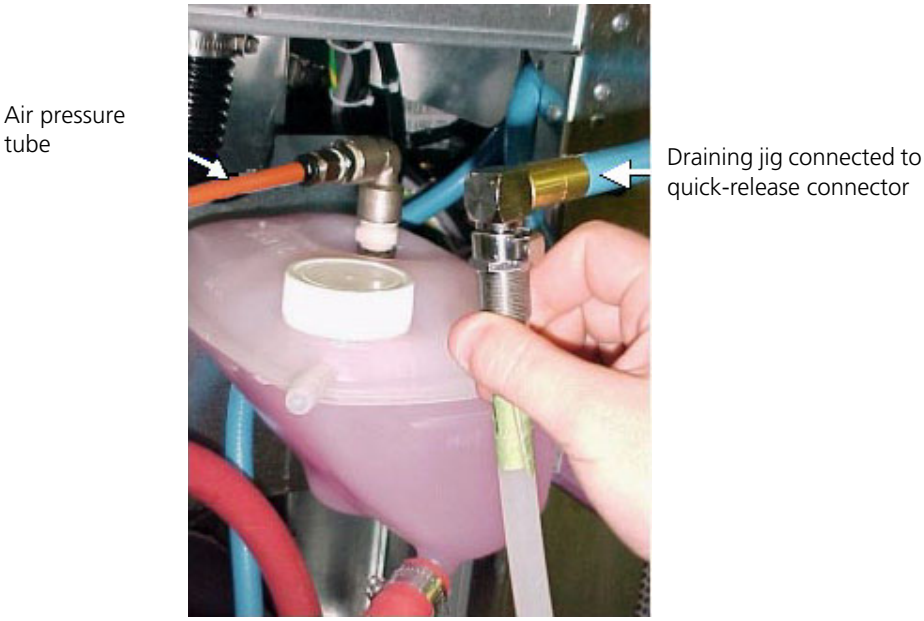
To drain the cooling liquid

1. Turn off the machine.
2. Remove the distribution box panel.
3. Disconnect the inlet quick-release connector from the reservoir.
4. Remove the reservoir from its holding position by pulling it upwards.
5. Drain the coolant into a clean vessel.
6. Return the reservoir to its holding position.
7. Insert the knee jig into the reservoir, as shown in the photograph.

8. Connect an air pressure tube into the knee jig, making sure that the total atmosphere setting does not exceed 2 atmospheres.



9. Plug the inlet quick-release connector into the draining tube jig, as shown in the photograph below:



10. Turn on the machine.

For more information about draining the cooling liquid:
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/procedures/maintnace/DrainingCoolingLiquid.htm

Replacing the Pump

If the color of the coolant has darkened from pink to purple, it indicates that the pump may be worn and problems with the system may occur. If the pump is worn, drain the cooling liquid, replace the water pump and strainer, as described herein, and then refill the reservoir with clean coolant.

Removing the Worn Water Pump

1. Turn off the machine.
2. Drain the cooling liquid. (See *Draining the Cooling Liquid* on page 411)
3. Remove the protective covers.
4. Disconnect the air pressure tube from the water pump.
5. Disconnect the quick release connector tube from the water pump.
6. Release the four quarter-inch Allen screws that connect the water pump base to the machine.
7. Remove the water pump from the machine for easy access.
8. Separate the water pump from the water pump base.

Installing the Water Pump



Note: Do not remove the plastic bag that covers the pipe inlet on the new pump until you have almost completed the procedure and it is time to connect the blue pipe. This prevents dirt from entering the system.

1. Attach the new water pump to the water pump base with 4 ¼" Allen screws.
2. Insert the water pump into the machine.
3. Secure the plate to the base by securing the bumpers, using Loctite.



Note: It is important not to loosen the bumpers.

4. Secure the base to the machine with the four quarter-inch Allen screws.
5. Connect the quick release connector tube to the water pump.
6. Connect the air pressure tube to the water pump.
7. Assemble the protective covers.
8. Refill the cooling liquid.
9. Turn on the machine.



For more information about replacing the pump:
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/procedures/maintnace/ReplacingTheWaterPump.htm

Testing the Cooling System Pressure

This test procedure is required to approve the cooling system of a Lotem 800 Quantum machine. Perform this test whenever you replace a component related to the water system.

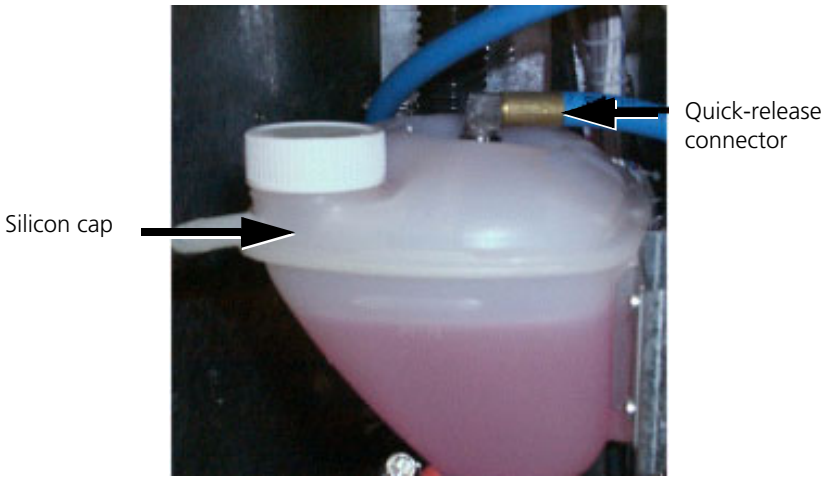
The procedure consists of two parts:

- Leakage test
- Water bleeding procedure

Note: The system is tested as a whole to ensure that there is no leakage or physical damage. Testing pressure is determined to be twice the working pressure of approximately 30 psi, so a 60 psi test is used.

Leakage Test

1. Perform the leakage test when the system is full of coolant.
2. Turn off the machine.
3. Remove the distribution box panel.
4. Disconnect the inlet quick release connector from the reservoir.



5. Turn on the Quantum machine. The water pump is automatically activated, and a stable pressure of approximately 65 psi develops until the safety integral valve of the pump opens, limiting the overall system pressure to 65 psi.
6. Check all the connection points for leakage or moisture.
7. If no leak is evident after 5 minutes, reconnect the inlet quick release connector to the reservoir.
8. If there is a leak, replace the relevant part.

Note: The pump should become warm.

Water Bleeding Procedure

1. Disconnect the inlet quick release connector from the reservoir.
2. Attach the draining tube jig (part number 507A3E583) to the inlet quick release connector.
3. Insert the bleed tube into a clean, empty vessel.
4. Remove the reservoir from its holding position by pulling it upwards. No additional tube disconnection is required.
5. Remove the silicon cap from the reservoir nozzle and empty the contents of the reservoir through the nozzle into a clean vessel. (There is no need to open the threaded cap.)

Note: Emptying the reservoir is required to prevent splashing when applying air pressure to the reservoir.

6. Return the silicon cap to the reservoir. The cap serves as a safety measure to avoid over-pressuring the reservoir.
7. Attach the special air inlet connection to the reservoir inlet with an internal pressure regulator (part number 507A3E584) and adjust the regulator to 20 psi. Make sure that the reservoir threaded cap is closed.
8. Apply 20 psi of air pressure to the reservoir until all coolant has drained through the bleed tube into the vessel.

Note: Air pressure must **not exceed 25 psi**.

9. Reconnect the inlet tube to the reservoir inlet (quick connection).

Note: The approximate amount of coolant in the system is one gallon.

For more information about the cooling system pressure test:
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/procedures/maintnace/CoolingSystemPressureTest.htm

Oiling the Water Pump's Motor

Requirements

SAE 10W oil

Procedure for oiling the water pump's motor

1. The water pump's motor should be oiled on an annual frequency.
2. Pry off the two plastic caps.



3. Fill each cap with one teaspoon of SAE 10W oil.
4. Replace the caps containing the oil. There is no need to perform any action on the actual pump.

For the latest information about oiling the water pump's motor:
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/procedures/maintnace/OilingWaterPump.htm

.

Apply What You Know

slide 12-23

Activity: Hands-on PM

Select one of the procedures described above, and perform it.

Instructor's Notes

It is important to give the engineers a chance to perform these procedures. Break the class into small groups, and let each group perform one of the PM procedures.

Let the engineers discuss their experiences with the class.

Lesson Summary

slide 12-24

In this lesson you learn how to perform the preventive maintenance procedures that are specific to the Lotem Quantum:

- Becker XY vacuum pump (DT 4.8) maintenance
- Dry drum vacuum pump (VT 4.40) maintenance
- UDRC particulate filter maintenance
- Oil kit maintenance
- Intake air filter maintenance
- Cooling system preventive maintenance
  - Strainer preventive maintenance
  - Draining the cooling liquid
  - Replacing the pump
  - Testing the cooling system pressure
  - Oiling the water pump's motor

Lesson 3 Case Studies: Analyze and Correct Problematic Exposures

slide 12-25



Why You Need to Know This

You will often be called in to a customer when there is a problem with the exposure on the plate. By knowing how to "read" the image artifacts, you may be able to diagnose the problem more quickly, and thus solve it more quickly. This lesson is about analyzing the image artifacts through case studies.



What You Need to Know

- How to analyze image artifacts
- Examine case studies and their solution

Analyzing the Image Artifacts

slide 12-26

> **Instructor's Notes**
>
> Collect as many examples of plates with these artifacts as you can. They will be an important part of the class, as students will be able to analyze the plates, and identify the problems.

Problems with images have been diagnosed and solved. These image artifacts have been cataloged and described as case studies. The case studies described below are all related to the Lotem Quantum.



Note: If you ever come across an interesting artifact that you would like to have analyzed, please submit it to Creo, using the procedure described in the document *Procedure for Submitting an Artifact* on TechPlanet.



For a document containing a catalog of several imaging artifacts:
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/documentation/Data_Path_Artifacts_1_2.pdf



Procedure for submitting an image artifact for analysis:
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/documentation/Submit_Artifact_Procedure.doc



For an online index of image artifacts:
http://techplanet.creo.com/output/heads/thermal_2/content/troubleshooting/artifact_index.htm

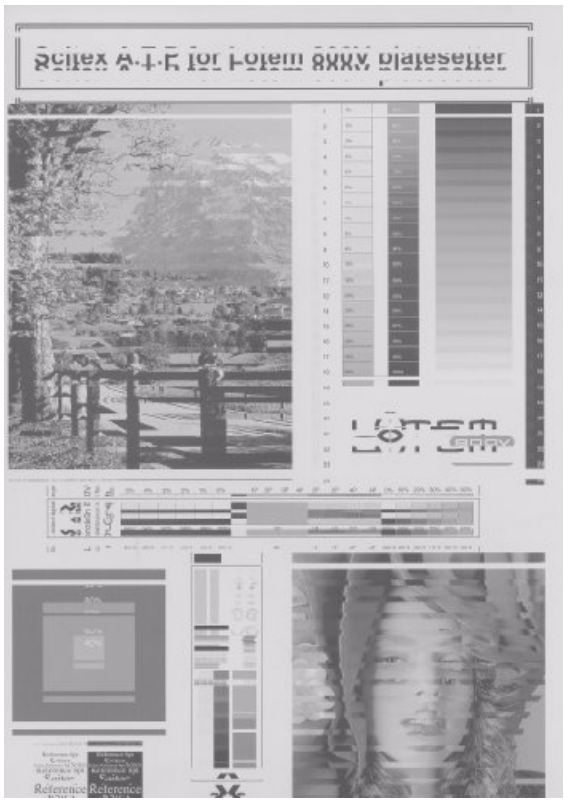
For the procedure on how to escalate the problem:
http://techplanet.creo.com/output/heads/thermal_2/nav/escalate.htm

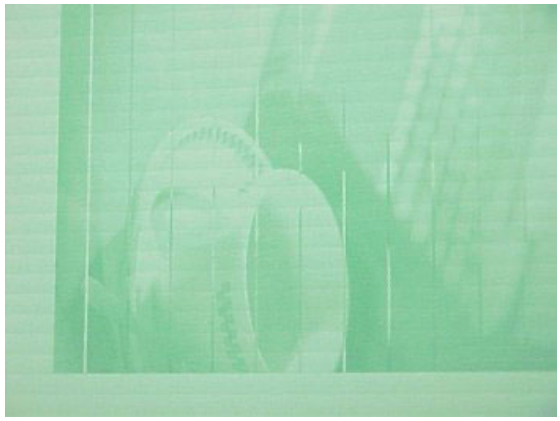
Data-Shift Artifacts (Vertical and Horizontal Shifts)

slide 12-27

Symptom

The following examples show the symptoms for vertical or horizontal data shifts:





Data shifts occur in many ways and include a variety of image artifact shifts. The most recent version of the TMCE firmware should improve this problem.

slide 12-28

Solution

1. Make sure the correct software versions are loaded on your machine. See *Checking for the Latest Firmware Versions* on page 376
2. Check that the TMCE nylon spacer has been installed, as described in *Replacing the TMCE Nylon Spacer*, http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/procedures/procedures/tmceNylonSpacer.htm.
3. Check that the data cable is properly connected to the TMCE board.
4. Check all the TMCE board connectors.
5. Check the TSP cable connection and replace, if necessary. To avoid disturbance, make sure the cables are properly isolated.
6. Expose the job again. If the job produces good results, the file is not corrupted.

7. Replace the TMCE, if necessary.
8. Replace the carriage amplifier, if necessary.
9. Replace the data cable, if necessary.

Image artifacts caused by data shifts on Lotem Quantum:
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/troubleshooting/l8qts_data_shift_i.htm

Tail-Gripper Artifacts

slide 12-29

Symptoms

Large arc-shaped focus artifacts on the tail gripper side of the plate.

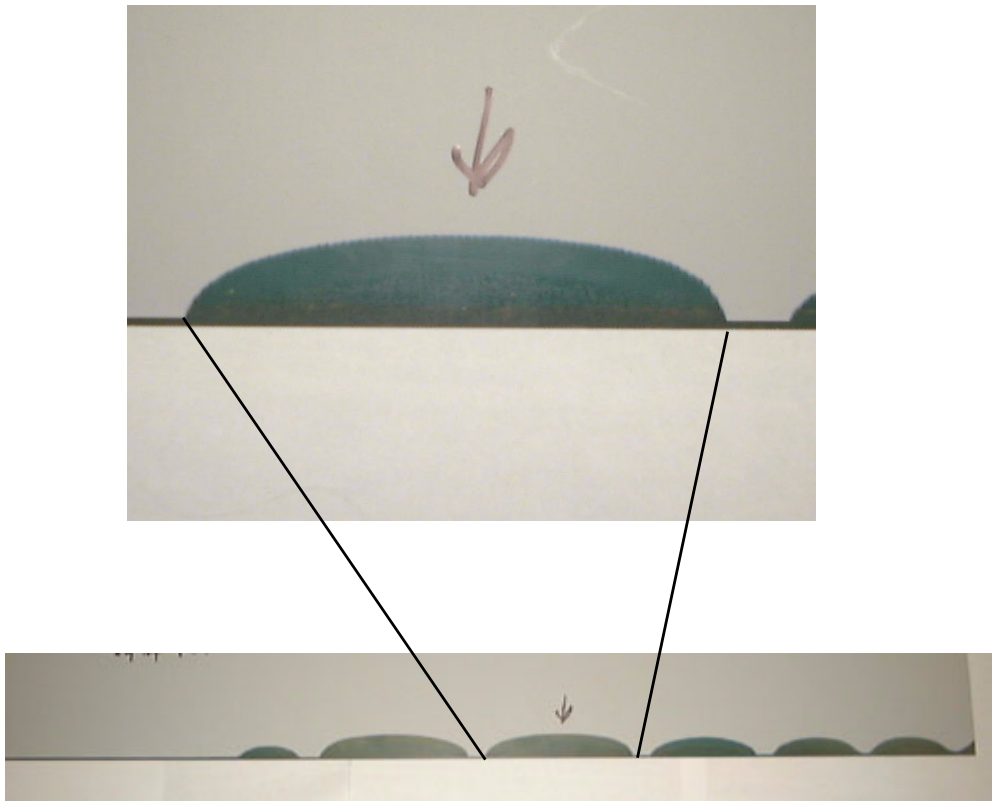
Cause

slide 12-30

The tail grippers do not hold the plate properly and as a result they press on the plate. This effect can be seen when the plate is loaded on the drum.

Solution

Check the loading of the plate. Measure the plate dimension around the drum and confirm that the tail grippers hold the plate correctly.



Bottom edge of plate

Mid-Plate Artifacts

slide 12-31

Symptom

Focus artifacts appear anywhere on the plate.

Cause

slide 12-32

Kinks or other damage in the plate.

Solution

Check the plate batch for kinks or damage. Check the loading system for roller problems, etc.

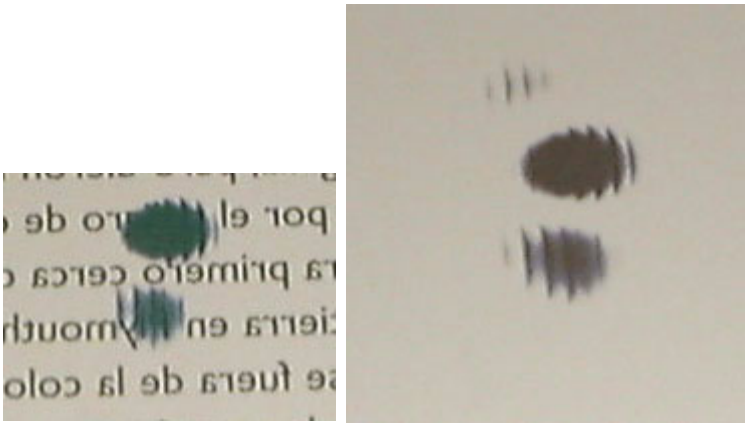


Plate damage causes mid-plate artifacts

Away-Side Artifacts

slide 12-33

slide 12-34

Thin line on the away side

Symptom

A thin line appears at the end of the plot on the away side. The line runs in the mainscan direction (around the drum).



Thin line at the end of the plot

Cause

Some Lotem Quantums were geometrically corrected without the thermister, and with an older version of TMCE firmware. When the thermister is installed and the TMCE firmware is upgraded, a scaling problem results and the image becomes shorter by approximately 500 microns.

Solution

Have the geometric correction corrected.

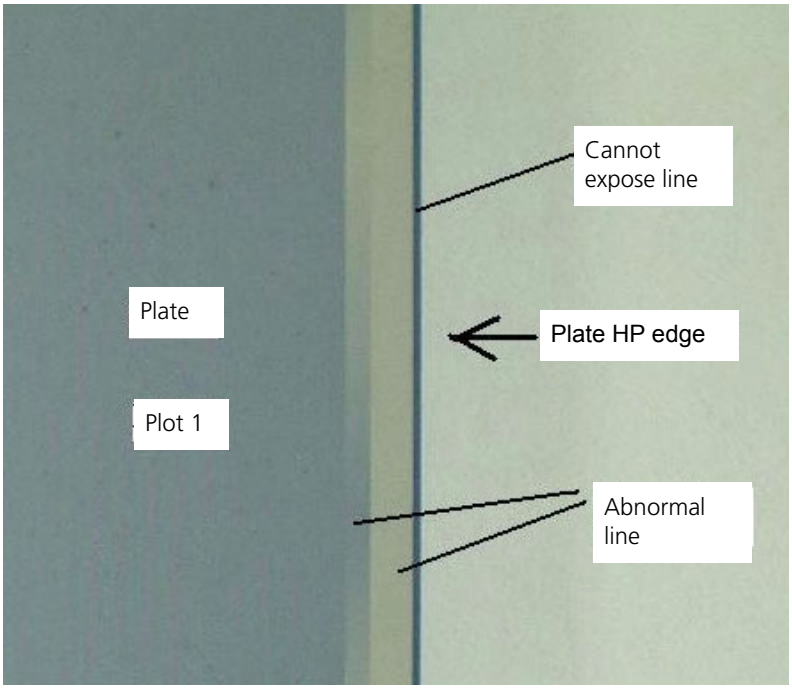
Note: You cannot correct this problem in the field. You will have to escalate it.

Line Missing

slide 12-35

Symptom

During a plot there is a black line, about 1 mm thick, that does not get plotted. This applies to **positive media** only.



Thin line missing on positive plates

Cause

slide 12-36

The reason for this problem is not completely clear. It is a combination of:

- Incorrect geometric correction (`gc`)
- The fact that the Lotem Quantum was upgraded from 1.06 TMCE firmware without correcting the `sys parm` values for `swaths to learn`
- Possibly other mechanical factors (such as the lead screw)

Possible Solutions

slide 12-37

1. Check that the parameter for `swaths to learn` is set to `true`.
   a. Use the following instructions:

```
Quantum>>redirect enable

Th2 >eng

Th2 >sys parm access 17 enable

Th2 >sys parm

Th2 >redirect disable
```

b. Check the listing of the `sys parm` and make sure that the following line was changed:

```
17 Swaths To Learn False 3 N/A
```

Should now read:

```
17 Swaths To Learn True 3 N/A
```

Note: The value 3 will probably change to 2 after you do a plot. The important thing to look for is the change to `True`.

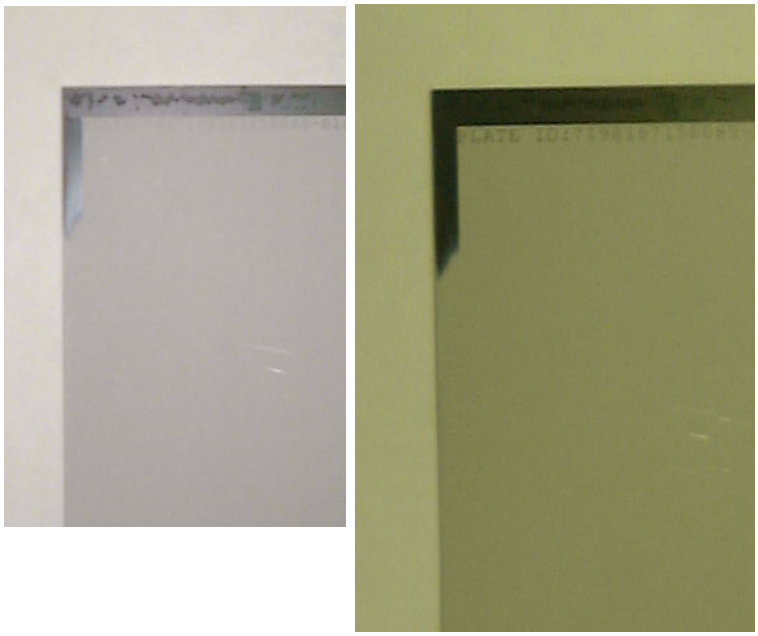
2. Make sure your machine was geometrically corrected properly. Contact your Lotem Quantum specialist for escalation.

Clamp Artifacts

slide 12-38

Symptom

Visible focus artifacts in 3 to 5 swaths at the beginning of the plot, located in the head gripper (leading edge) home corner.



Artifacts on the top corner of the plate

Cause

slide 12-39

Old TMCE firmware, Version 1.06

Solution

Upgrade the firmware.

If no firmware upgrade is available, from the head (`TH2>`), change the access and value of `swaths to learn` (parameter number `17` of `sys parm`).

Use the following commands:

```
Quantum>> redirect enable

TH2 > eng

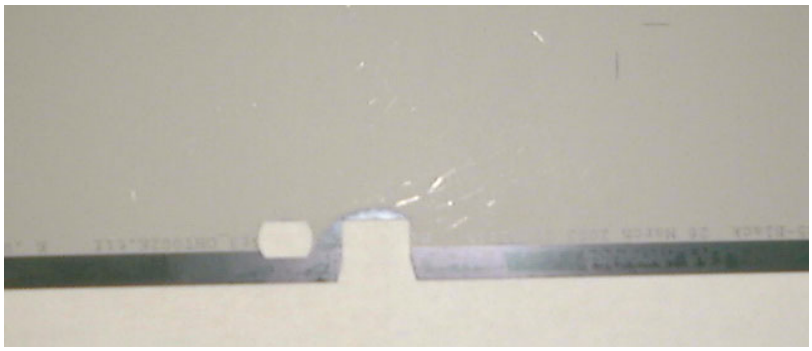
TH2 > sys parm access 17 disable
```

Punch Artifacts

slide 12-40

Symptom

Visible focus artifacts during and after a punch



Artifacts on the top edge of the plate

Cause

slide 12-41

When a plate is punched, the focus system tries to compensate and results in visible oscillations.

Solution

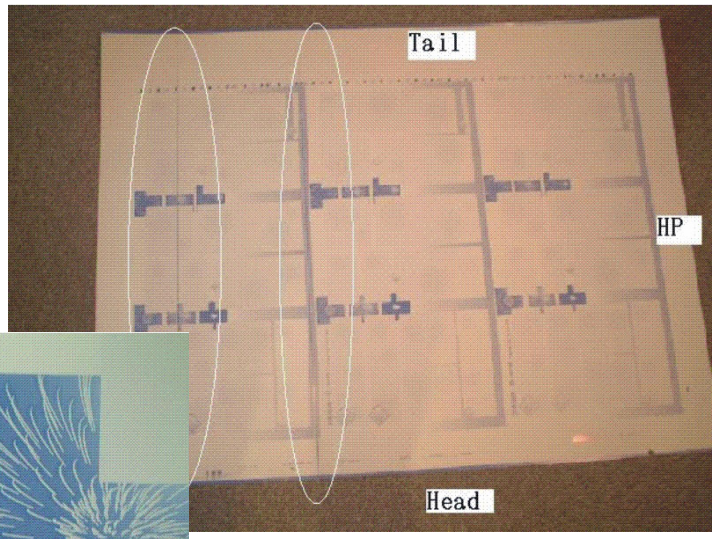
Do not punch the plate. Usually the artifact does not interfere with the image.

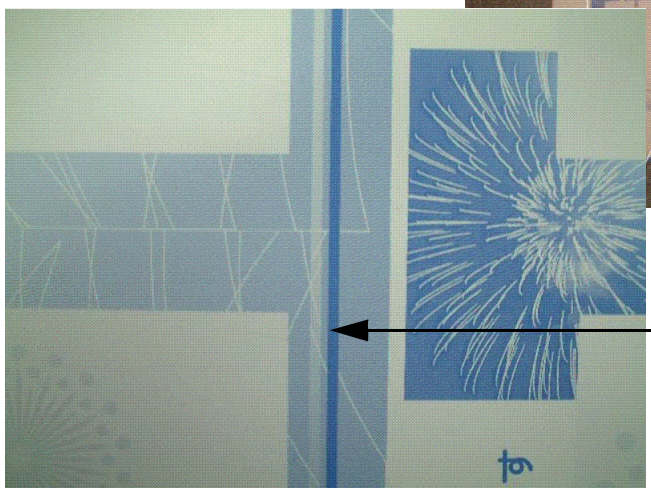
Artifacts on the Whole Image

slide 12-42

Symptom

During the plot, black lines appear, running from the center of the plot to the away side. The lines run around the drum and are about 1 mm wide. This happened on a system using Prinergy.





Black lines appear throughout the image

Black lines appear throughout the image

slide 12-43

Cause

The lines were caused by a broken coupling screw on the lead screw. It was initially thought that the lines were caused by Prinergy running too slowly, but this was not the case.

Solution

Check with a Lotem Quantum Specialist and confirm that this is the source of your problem. Refer to the Lotem Quantum Escalation page on TechPlanet.



Coupling screw on the lead screw

Triangular Pixel Shape

slide 12-44

Symptom

The plate looks fine. The customer used the platesetter for 3 months before he noticed that there was a problem. When you look closely at text or fine print, you can see a shadow where there should not be one.

When you look through a microscope, the pixel is corrupted. The pixels look triangular.



Look at the pixels through a microscope

Cause

slide 12-45

The two TSP cables were swapped.

Solution

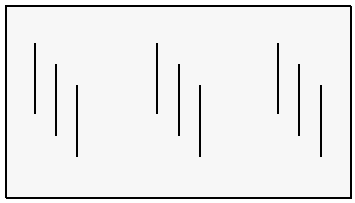
Make sure the TSP cables are connected correctly.

Blanks and Lines

slide 12-46

Symptom

Artifacts on the plate display a blank area and then lines on the background. The lines are at the same height.



Lines on plate

Cause

slide 12-47

The V-block is not straight enough. The carriage occasionally moves.

Solution

Clean the V-block and oil it with silicone oil.

Instructor's Notes

Hand out the plate examples that you have collected with image artifacts. The students should analyze them according to the examples shown in the lesson.



Apply What You Know

slide 12-48

Activity: Diagnose the Artifact

Look at the examples of image artifacts that your instructor gives you. Use the case studies described in the lesson to diagnose and solve the problem.

Plate Artifact #1:

Description: _____

_____

My diagnosis:_____

_____

Suggestion for solution:_____

_____

Plate Artifact #2:

Description: _____

_____

My diagnosis:_____

_____

Suggestion for solution:_____

_____

Lesson Summary

slide 12-49

In this lesson you analyzed image artifacts that have been exposed by the Lotem Quantum. By recognizing the artifacts, you will be more likely to be able to determine the cause of the problem and to solve it.

Lesson 4 Troubleshoot the Lotem Quantum

slide 12-50



Why You Need to Know This

In this lesson you will be able to apply all the knowledge you have gained so far in the course to solving problems in the Lotem Quantum. Go ahead and troubleshoot!



What You Need to Know

- Useful tools for troubleshooting
- Techniques for troubleshooting the Lotem Quantum

Instructor's Notes

Use this lesson as a means to wrap up all the diagnostic tools and facilities that have been described throughout the course. Briefly go over the following few sections.

Once you have finished, sabotage the machine in some of the ways suggested, and give the engineers time to troubleshoot.

Before you begin with the troubleshooting exercises, here are some more tools that might help you diagnose the problem: Verbosity levels, and learning how to use the troubleshooting section of TechPlanet!

Verbosity Levels

slide 12-51

Using the verbosity levels may help you troubleshoot the Lotem. Depending on the level, you can see as much data as you need.

Verbosity level	Definition	Command	Information level
C	Customer	`>>vbs user customer`	Minimum
S	Service	`>>vbs user service`	
E	Engineer / eng	`>>vbs user eng`	
D	Developer / debug	`>>vbs user debug`	Maximum

- Text is only displayed at the specified or higher level, for example
  - Level D: `MDH: Command sent properly`
  - Level E: `DRS: Drum command received 4704`

Troubleshooting on TechPlanet

slide 12-52

This TechPlanet facility is very useful for identifying the problems and solutions.



Lotem 800 Quantum Troubleshooting page:
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/nav/troubles.htm



Flowchart—Troubleshooting the TH2:
http://techplanet.creo.com/output/heads/thermal_2/content/troubleshooting/troubles_flowchart.htm

Take a look at the following TechPlanet Troubleshooting example:

Error: Dongle Not Found or Detected

The '`Dongle not found`' or '`Dongle not detected`' error message may appear in the Splot diagnostics monitor after you have finished one or more of the following tasks:

- Replacing a TMCE board
- Replacing a dongle
- Upgrading the Lotem Controller software to version 3.51.02

Cause

The cause of this problem is that the TMCE card and the dongle identify each other and encrypt protected data using both the TMCE board serial number and the dongle serial number. If either of these is changed, the dongle will no longer be found, and all protected parameters will revert to their defaults.

Solution

1. Verify the value currently set for the `MaxDrumSpeed` parameter as follows, and write the value down:
   - In the Splot diagnostics monitor, at the `Quantum>>` prompt, type `feature`. The maximum drum speed value is displayed. For example, 400 rpm.
2. Reinitialize the dongle by entering the following commands in the Splot diagnostics monitor:



Note: It is important to be **extremely** careful to enter the commands exactly as they appear in the instructions below. Not doing so can damage the system.

   a. At the `Quantum>>` prompt, type `access dev`
   b. At the `Quantum>>` prompt, type `stg delete flash 2405`
   c. At the `Quantum>>` prompt, type `reset`

   The TMCE will detect the dongle and reset the values for all related parameters to their original defaults. For example, the default value for the maximum drum speed parameter is 180 RPM (MaxDrumSpeed=180 RPM).

3. If the value for the `MaxDrumSpeed` parameter (as verified in Step 1 above) was originally different from the default, relicense the drum speed feature as follows:
   a. In the Splot diagnostics monitor, at the `Quantum>>` prompt, type `access enable`.
   b. Contact your local PSM to obtain the next command that should be entered, and then type the command. (A password is required.)
   c. Confirm that the drum speed feature has been successfully relicensed. At the `Quantum>>` prompt, type `feature`. The value for the `MaxDrumSpeed` parameter is displayed.



For more information about the error "Dongle not found":
http://techplanet.creo.com/output/computer_to_plate/lotem_quantum/content/troubleshooting/l8qts_dongle_not_found.htm#step_1

Troubleshooting Exercises

slide 12-53

Your instructor will sabotage the Lotem Quantum, and you will have to find and correct the problems. **Good luck!**

Instructor's Notes - Sabotage Ideas

Below are a list of ideas on how to sabotage the platesetter so that the engineers will be exposed to real-life problems that commonly occur in the field.

If you see that the students are far off track, give them some hints. Encourage them to use the diagnostics, TechPlanet troubleshooting pages, remote support, Service Shell analysis, etc.

Training Tip

Build up a collection of faulty parts for the machine. These will always come in handy for these troubleshooting exercises!

Sabotage	Expected Result
Load a version of the firmware, but stop it in the middle so that it does not load successfully.	Machine will not operate correctly. The engineer will have to reload the firmware.
Take out the dongle.	Get an error about the dongle not found. Cannot expose.
Swap the COM 7 and COM 8 ports on the TMCE board (See *TMCE Board* on page 46).	No Splot communication.
Swap the TSP 1 and TSP 2 to get an example of corrupted data.	The pixels on the exposed plate are triangular.
Swap the carriage amplifier with a faulty one.	The carriage will not move as it should.
Take out the cable of the hotlink from the TMCE board.	The platesetter will not expose correctly. Bad image.
Swap the connector on the TMCE board from J44 to J42. (SCSI and TSP connectors are identical - see *TMCE Board* on page 46)	The platesetter will not expose.
Change the resolution in Splot.	Mode will not fit the head resolution.
Change the baud rate on the TMCE.	No Splot communication.

Sabotage	Expected Result
Disable the laser power.	No exposure.
Change media / HDM names.	Cannot start and use media correctly.
Delete the Rcon board from the hardware.	Bad startup - Rcon error.
Load an old version of either the Xilinx or head firmware.	Exposure artifacts will be noticed, or the platesetter won't start at all.
Swap the air tube to the Z-stage.	Some of the plates will be out of focus.
Change head type to be 1 in Splot.	Platesetter will not recognize the head as type 3 TH2.
Add your ideas here:	

Module Wrap-up

slide 12-54

After completing this module, you should be familiar with:

- Running Lotem Quantum diagnostics
- Preventive maintenance procedures that are performed on the Lotem Quantum
- Image artifacts, their cause and solution
- Troubleshooting techniques

Instructor's Notes

Summarize the important information covered in this module.

Remind students to view the module Self-Assessment Form.

Build a link to the next learning outcome.