ECAD-MCAD Collaborator User's Guide

Software Version 2.3

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Chapter 1
Introduction to the ECAD-MCAD Collaborator

The ECAD-MCAD Collaborator is an application that facilitates the exchange of PCB layout and mechanical data between a designer using Expedition PCB, Board Station XE or PADS (from Mentor Graphics) and a designer using a third party mechanical design application such as PTC Pro/Engineer. This chapter provides the following information:

- Introduces the ECAD-MCAD Collaborator application by explaining the need for collaboration and how ECAD-MCAD Collaborator serves that need.

- Explains the differences between the basic 3D PCB Viewer and the 3D PCB Viewer augmented with ECAD-MCAD Collaborator functionality.

- Describes how to launch the ECAD-MCAD Collaborator application.

Collaboration Between PCB Layout and Mechanical Design Organizations

Every PCB design is at least in part driven by the mechanical aspects of the product for which it is being designed. The shape of the board outline, locations of mounting holes, connectors, switches, and so on, are constrained by the system or enclosure in which the PCB will be mounted.

The ECAD (Electronic Computer Aided Design) and MCAD (Mechanical Computer Aided Design) groups might be working on the same product, but creating PCB and mechanical designs independently from each other. These ECAD and MCAD groups could be co-located, separated by several time zones, and might not even be part of the same company. Over the product development period, it is very likely that either organization might need to make changes to their design that could impact their counterpart organization. Prompt understanding, communication, and agreement of such changes becomes important in managing development costs, and to the overall success of the product.

Today, communication methods used to explain and adopt such changes are often limited to e-mails, phone conversations, and marked up drawings. These methods are sometimes inefficient and can lead to mis-communication and confusion, resulting costly errors later in the manufacturing process. To solve these problems, the Mentor Graphics ECAD-MCAD Collaborator provides an application and user interface that engineers in both organizations can use to capture and collaborate on minor iterations and changes in the design that could potentially affect design parameters in the other organization.

How ECAD-MCAD Collaborator Integrates into the Design Process

To facilitate data exchange, both the PCB layout group and mechanical design group must be able to see the impact of the change. To visually represent the design and any proposed changes, the ECAD-MCAD Collaborator uses the base 3D viewing capabilities present in the Mentor Graphics 3D PCB Viewer application. The 3D PCB Viewer application must be installed to run the ECAD-MCAD Collaborator software.

Once installed, the ECAD-MCAD software augments the viewer with additional features that allow the viewing of incremental changes within a PCB layout or mechanical design and the creation and management of change requests between organizations. In a Collaboration session, one designer can make changes in the design system that are then captured and displayed by the Collaborator. At that point, the proposal can be shared with a second designer (either through a shared directory or via e-mail) for consideration and feedback.

The 3D PCB Viewer window of the ECAD-MCAD Collaborator allows a user to see the impact of change from many different perspectives in two or three dimensions. The collaboration features let users propose change requests resulting from minor changes in the design, view and understand the scope and impact of a such a change to the corresponding organization, review change requests, accept or reject change requests, and manage change request queues.

Data Exchange Format

The Collaborator is designed so that ECAD and MCAD designers can work in their own design environments, but still communicate text and graphics transactions back and forth quickly and cleanly. The graphics that are transmitted are only those required to adequately communicate the desired change, and are only a subset of the actual design data.

The application exchanges incremental data between ECAD-MCAD Collaborator sessions using an XML format that follows the new ProSTEP iViP recommendation based on ISO standard 10303. The ProSTEP iViP Association is a consortium of member companies recommending non-proprietary standards for the exchange of ECAD and MCAD collaborative data.

Because the transmission and format of data between ECAD-MCAD Collaborator sessions is largely transparent to users of the ECAD-MCAD Collaborator application, this manual does not discuss the actual format of transmitted data. However, details on the ProSTEP iVIP ECAD/MCAD Collaboration recommendation is available by visiting http://www.prostep.org/en/.

Differences between ECAD-MCAD Collaborator and 3D PCB Viewer

The ECAD-MCAD Collaborator user interface relies on the Mentor Graphics 3D PCB Viewer software to provide the functionality to display a visual 3D representation of the circuit board, but with several additions to assist ECAD and MCAD designers to initiate collaboration sessions, propose changes, and accept/reject proposals. The resulting ECAD-MCAD Collaborator interface contains the primary viewing features found in the standard 3D PCB Viewer application, but augments the 3D PCB Viewer interface with the following added functionality (Figure 1-1):

- An EDMD tab in the display control area with collaboration-specific items.

- A Collaborate pulldown menu item with several collaboration menu items.

- A Collaborate toolbar with icons corresponding to Collaborate pulldown menu items.

- Enhancements to the graphical viewing area to highlight an object affected by a change.

Figure 1-1. ECAD-MCAD Collaborator User Interface
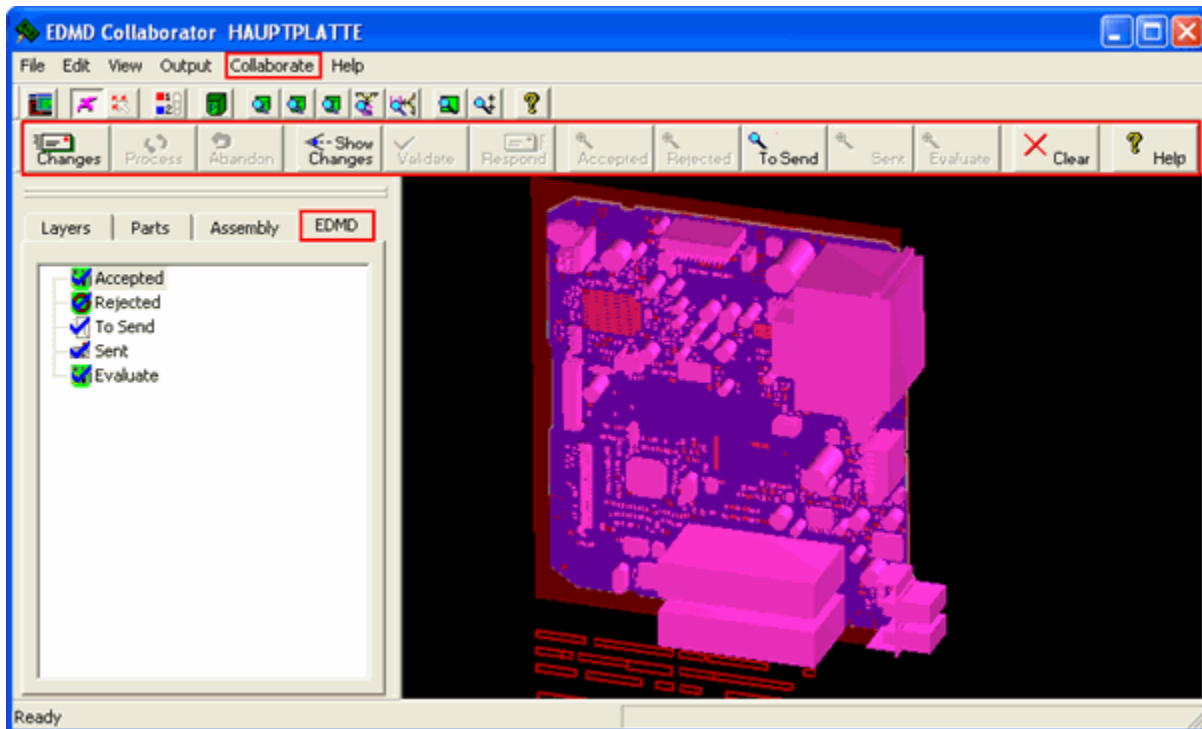
This manual only discusses the features unique to the ECAD-MCAD Collaborator. For information about the viewing features found in both the ECAD-MCAD Collaborator and 3D PCB Viewer products, refer to the *3D PCB Viewer User's Guide*.

Collaboration Process Flow

The general steps of the collaboration process flow follows the items on **Collaborate > Actions** pull-down menu (Figure 1-2).

Figure 1-2. Collaborate > Actions Pull-down Menu
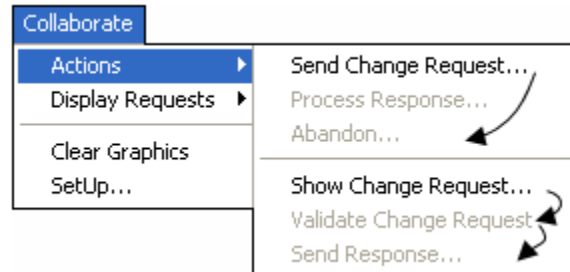
Each menu item in the **Actions** submenu performs a specific request-related action. The following lists the high-level steps in the collaboration process when using the ECAD-MCAD Collaborator application:

1. Both collaboration parties open the design tool on the design under consideration and then launch the ECAD-MCAD Collaborator from that design tool. In the collaboration session, one person takes on the role of the *change initiator,* while the other person takes on the role of the *change recipient*.

   Your collaboration role determines which change request actions are pertinent. In Figure 1-2, the change initiator uses the top two menu items, while the change recipient uses the bottom three menu items. The arrows indicate the order in which the menu items are executed for a particular change request.

2. After setting up the session, the initiator uses the **Send Change Request** menu item to create one or more proposed change requests. The ECAD-MCAD Collaborator treats each change request as a transaction that requires a response from the request recipient.

   The ECAD-MCAD Collaborator requires completion of the transaction cycle for a single change request before allowing another change request to be sent.

3. The recipient uses the **Show Change Request** menu item to view the proposed change request and see a summary in ECAD-MCAD Collaborator of how the proposed changes affect the design.

4. The recipient uses the **Validate Change Request** menu item to send the changes to the design open in the parent application, where more extensive checks can be run to evaluate the changes within the context of the actual design.

5. After evaluating the changes, the recipient uses the **Send Response** menu item to send a response back to the initiator listing which changes in the change request are acceptable and those changes that were rejected.

6. The initiator uses the **Process Response** menu item to process the recipients response and close the transaction.

7. After reaching an agreement, both the initiator and recipient update their designs with the changes that were acceptable. For those changes that were rejected, the initiator can decided whether or not to generate a new change request with a different proposed solution.

8. When both parties are satisfied with the changes and have incorporated all agreed up changes, they then close their respective ECAD-MCAD Collaborator sessions.

Chapter 3 "Using the ECAD-MCAD Collaborator" provides detailed instructions to perform each step in the process flow.

Graphically Showing Request States

Both parties in the collaboration session can use the **Collaborate > Display Requests** pull-down menu items (Figure 1-3) to view the status of requests in the graphic area of the ECAD-MCAD Collaborator. Chapter 3 "Using the ECAD-MCAD Collaborator" provides detailed information about how to use the menu items in Figure 1-3.

Figure 1-3. Collaborate > Display Requests Pull-down Menu
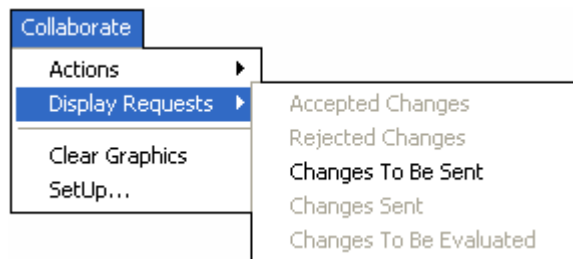
An Example Use Case

The following steps and Figure 1-4 describe an example how an ECAD designer and MCAD designer might use the ECAD-MCAD Collaborator in a collaborative session:

1. Due to an enclosure change, the MCAD designer needs to move a mounting hole. In a collaboration session, the MCAD designer uses the ECAD-MCAD Collaborator to transmit a new mounting hole location suggestion to the ECAD designer.

2. The ECAD designer evaluates the change and determines the re-layout would be too extensive. The ECAD designer rejects the change and suggests a new alternative mounting hole position.

3. The MCAD designer reviews the suggestion in their design system and finds it satisfactory. The MCAD designer uses the ECAD-MCAD Collaborator to send the acceptance back to ECAD.

4. Both the ECAD designer and MCAD designer update their designs.

Figure 1-4. An Example Collaborative Use Case
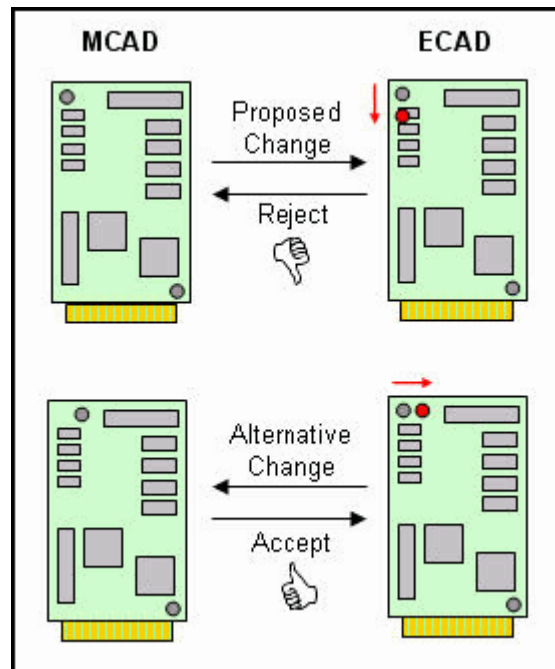
Launching the ECAD-MCAD Collaborator

___ **Note** ___
The ECAD-MCAD Collaborator must be installed in the same directory as other Mentor Graphics products.

From Expedition PCB or Board Station XE, launch ECAD-MCAD Collaborator using the **ECO > EDMD Collaborator** pull-down menu item. To launch EDMD from PADS, choose **Tools** > **EDMD Collaborator** pull-down menu item.

The ECAD-MCAD Collaborator maintains a connection with the launching application so that any changes made in Expedition PCB or Board Station XE are then captured, as explained in Chapter 3.

Incase **Expedition** is in the variant view when attempting to invoke ECAD-MCAD collaborator, the menu to invoke the ECAD-MCAD collaborator is disabled to prevent any edits to Expedition from ECAD-MCAD collaborator. Furthermore, the collaborator tool bar is disabled and any send or apply change action from the collaborator dialogs is prevented if Expedition was switched to the Variant view during a collaboration session.

In the case of **Board Station XE**, the ECAD-MCAD collaborator menu is only enabled when import of board geometry edits is not allowed and editing of board geometry elements is allowed.

Every BSXE design has a bsxe_data_mapping.ini file in the pcb folder *"<Design>/pcb"*. This file contains options for generating the XE database. The two keywords that control the board geometry elements are:

- MGC_UPDATE_FROM_BOARDGEOM: Specifies whether to import board geometry edits into BSXE or not. Its default value is "yes".

- MGC_ALLOW_EDIT_BOARDGEOM_ELEMENT: Specifies whether to allow editing board geometry elements in BSXE or not. Its default value is "no".

For enabling EDMD collaboration, it is mandatory to set them to:

- MGC_UPDATE_FROM_BOARDGEOM = no

MGC_ALLOW_EDIT_BOARDGEOM_ELEMENT = yes

When EDMD Collaborator application is up and running through PADS some activities are not allowed in PADS Layout. This includes:

- Running the File/New command

- Deleting Board Outline (Delete, Cut commands)

- Running the Save As command

- Running the Decal Editor

- Switching to Router (using Route button on Standard Toolbar or by using Tools/PADS Router… command)

- Changing on-line DRC mode

Each attempt to perform a restricted activity will result in an error message:

"This activity is restricted during EDMD collaboration session".

Prerequisites & Limitations

There are some prerequisites & limitations that should be taken into consideration before using the ECAD/MCAD Collaborator tool. These prerequisites & limitations are:

- Only one board object and one route keepin are allowed. These objects can never be deleted. The route keepin can only span all layers.

- Library data is not editable. The holes & mechanical cells can be added, but electrical cells can not be added.

- Generally, cutouts in shapes are ignored.

- Only a component shape is used to define a cell. Components do not contain pins, holes or nested cells.

- Only a hole shape is used to define a hole. The hole's shape is limited to round holes so, holes of other shapes are ignored. The hole definition is just the hole with a plated flag. There are no pads or other attributes.

- Groupings of objects are ignored.

Caution

The ECAD and MCAD library data must be in sync. The component shapes must be similar, have the same origin and orientation. If not, then apparent incorrect component placements will occur even on the top of the board.

Limitations for the PADS 9.3 flow

The scope of data exchanged between ECAD and MCAD systems supported in PADS 9.3 version of EDMD Collaborator is limited to:

- Board geometry - includes board outline but no board cutouts, and layer stackup information

- Electrical Components placed on the board

- Mechanical Components placed on the board

- Mounting Holes – plated or non-plated (board-level) holes

- Single-layer Placement Keepouts (called Placement Obstructs in EDMD dialogs) – may have height restriction

Chapter 2
ECAD-MCAD Collaborator Quick Reference

The ECAD-MCAD Collaborator provides many different ways to execute the same commands:

- Pulldown menus

- Toolbar Icons

- Tabbed Sheet Items

This chapter summarizes each of the commands, icons, or tabbed sheet items and the tasks they perform in the user interface.

Pulldown Menus

Figures 2-1 and 2-2 show the pulldown menu items associated with collaboration tasks.

Figure 2-1. Collaborate > Actions Pulldown Menu Items
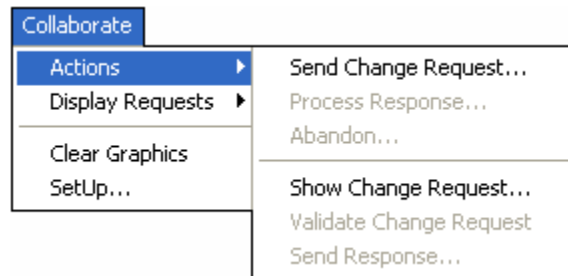
Figure 2-2. Collaborate > Display Requests Pulldown Menu Items

Toolbar

Figure 2-3 shows the ECAD-MCAD Collaborator tool bar.

Figure 2-3. ECAD-MCAD Collaborator Toolbar

Command Summary

Table 2-1 provides a summary of ECAD-MCAD Collaborator commands and the tasks they perform.

Table 2-1. ECAD-MCAD Collaborator Commands

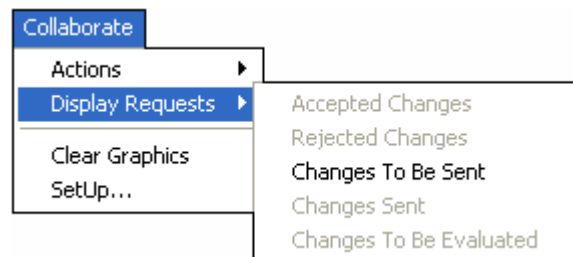| Menu Command	Function	Icon
Collaborate > Actions > Send Change Request	Displays the Send Change Request dialog box that a change request initiator uses to create a list of proposed changes and encapsulate them into a change request file.	
Collaborate > Actions > Process Response	Displays the Process Response dialog box that a change request initiator uses to view and process the accept/reject response from the change recipient.	
Collaborate > Actions > Abandon	Allows you to return back from the process response state to the state before which the message was sent.	
Collaborate > Actions > Show Change Request	Displays the Show Change Request dialog box that a change request recipient can use to view the contents of a change request file and graphically display an individual proposed change on the 3D view of a design.	
Collaborate > Actions > Validate Change Request	Incorporates the change into the design displayed in the parent application so that the change can then be validated for acceptance or rejection.	
Collaborate > Actions > Send Response	Displays the Send Response dialog box that a change request recipient can use to accept or reject individual changes that are part of the request.	
Collaborate > Display Requests > Accepted Changes	Displays the changes accepted by the request recipient in green in the graphic area.	
Collaborate > Display Requests > Rejected Changes	Displays the changes rejected by the request recipient in red in the graphic area.	

Table 2-1. ECAD-MCAD Collaborator Commands (cont.)

Menu Command	Function	Icon
Collaborate > Display Requests > Changes To Be Sent	Displays changes to the design in yellow in the graphic area that are captured in a pending change request but have not yet been sent by the change initiator.	To Send
Collaborate > Display Requests > Changes Sent	Displays changes that have been sent to the change recipient by the change initiator, but not yet acted upon, in green in the graphic area.	Sent
Collaborate > Display Requests > Changes To Be Evaluated	Displays changes that the change recipient has viewed, but not yet evaluated.	Evaluate
Collaborate > Clear Graphics	Clears any colored highlights from the graphic area.	Clear
Collaborate > Setup	Displays the Setup parameters dialog box with which to configure the ECAD-MCAD Collaborator session and designate yourself as a *change request initiator* or a *change request recipient*.	None

Chapter 3
Using the ECAD-MCAD Collaborator

This chapter provides the procedures to use the ECAD-MCAD Collaborator application in a collaborative session.

Invoking the ECAD-MCAD Collaborator

Perform the following steps to invoke the ECAD-MCAD Collaborator:

1. Contact the party with which you want to collaborate (usually by telephone, email, or internet messaging) indicating your desire to have a collaboration session on a particular PCB layout or mechanical design using the ECAD-MCAD Collaborator.

2. If the design is for a PCB layout, open Expedition PCB or Board Station XE on your local copy of the design.

   If the design is for a mechanical enclosure or construction, open the mechanical design application on the design.

3. From within Expedition PCB or Board Station XE, choose the **ECO > EDMD Collaborator** pull-down menu item. To launch EDMD from PADS, choose **Tools > EDMD Collaborator** pull-down menu item.

   Incase Expedition is in the variant view, the menu to invoke the ECAD-MCAD collaborator is disabled to prevent any edits to Expedition from ECAD-MCAD collaborator.

   For information about invoking the ECAD-MCAD Collaborator from a third party mechanical application, refer to the documentation for that application.

   _____ **Note** _____

   The Persistent.xml file is only updated when EDMD collaborator runs. It is updated compared to the last collaboration state.
   The Persistent.xml file can be found at *<Design Name>* > Pcb> config> Persistent.xml.
   _____

The ECAD-MCAD Collaborator session window appears as shown in Figure 3-1.

Figure 3-1. Invoking the ECAD-MCAD Collaborator
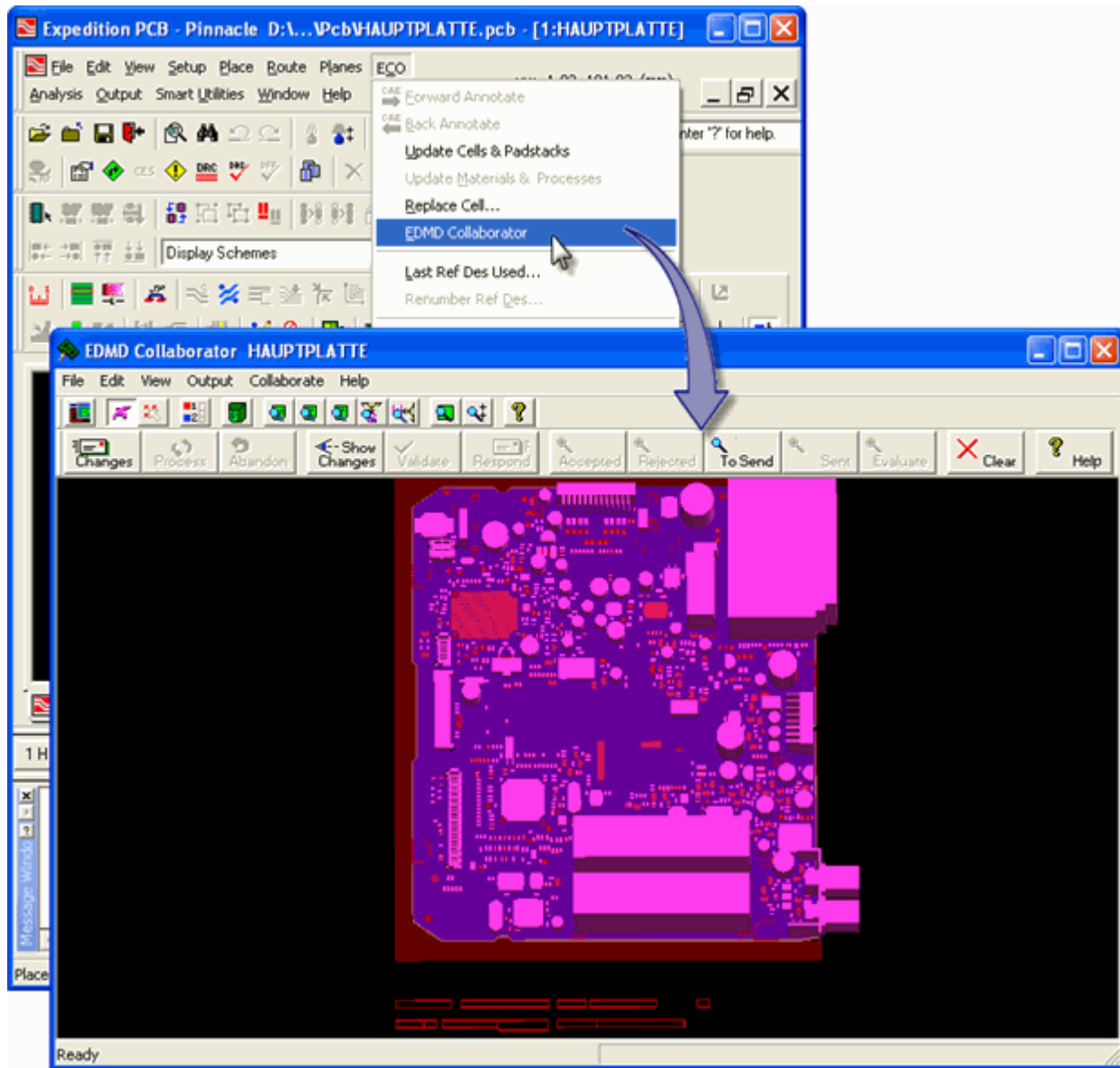
Setting Up the Collaboration Session

After invoking the ECAD-MCAD Collaborator, both parties must choose the **Collaborate > Setup** pull-down menu to display the Setup parameters dialog box (Figure 3-2) and then complete the dialog box to specify the same collaboration method. The two methods of collaboration are:

- Collaborating using a shared directory location that both collaboration parties can access.

- Collaborating through email.

The following headings explain each set up method.

Figure 3-2. Setup Parameters Dialog Box
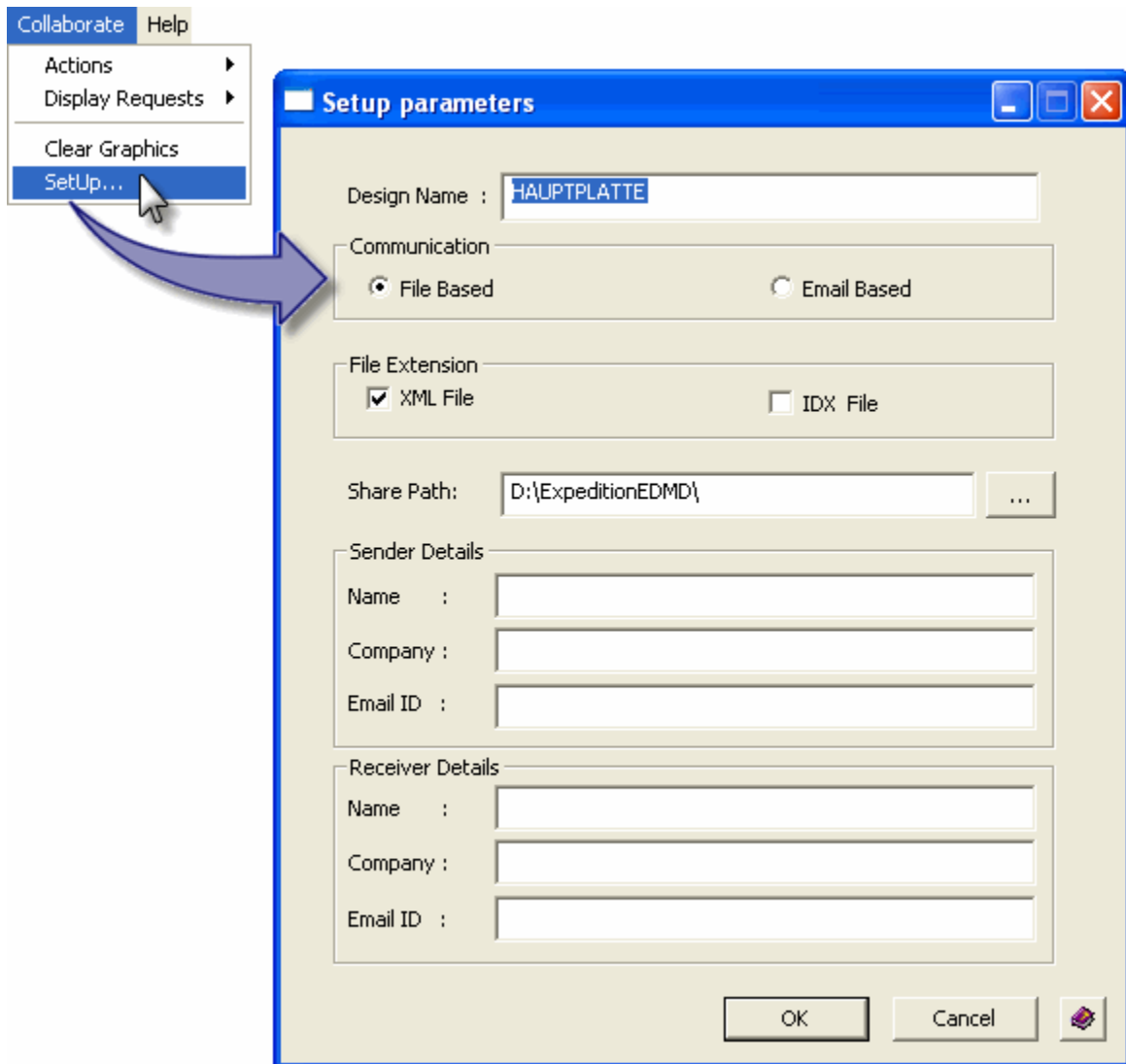
Using a Common Collaboration Directory

To use a common directory (file-based communication) as the collaboration method, complete the Setup parameters dialog box as follows:

1. If desired, change the name that appears in the **Design Name** field. The default is the name of the design that was open in the parent application when you launched the ECAD-MCAD Collaborator session. However, you can change the value to any name you want to use when communicating with your collaboration partner.

2. Choose **File based** as the communication method.

3. In the **File Extension** field, choose XML file as the type of the transaction file.

4. In the **Share Path** field, specify the path to a shared directory that both parties can access. Both parties must have write access to this directory.

5. Since email is not being used as the collaboration method, leave the **Sender Details** and the **Receiver Details** fields empty.

With the ECAD-MCAD Collaborator configured to use a common collaboration directory, both parties must monitor the shared directory location since the Collaborator is not configured to send automatic email when a request event occurs. That is, the request recipient must monitor the shared directory location for new requests, and the request initiator must monitor the shared directory for request responses.

Collaborating Through E-mail

To collaborate through email, complete the Setup parameters dialog box as follows:

1. If desired, change the name that appears in the **Design Name** field. The default is the name of the design that was open in the parent application when you launched the ECAD-MCAD Collaborator session. However, you can change the value to any name you want to use when communicating with your collaboration partner.

2. Choose **Email based** as the communication method.

3. In the **File Extension** field, choose XML file as the type of the transaction file.

4. In the **File Location** field, specify the path to a local directory that can serve as a temporary storage location as you initiate and process requests. Your collaboration partner does have to have access to the directory you specify.

5. Since email being used as the collaboration method, complete the **Sender Details** and the **Receiver Details** fields.

With the ECAD-MCAD Collaborator configured for email collaboration, the application sends an auto-generated email to your collaboration partner with an attached XML file for each action on a request. When using email-based collaboration, you must save the attachments on incoming e-mails before you access the contents of the file in the ECAD-MCAD Collaborator.

Sending a Baseline Request

If there is no collaboration history for the design, perform the following steps to create a baseline request and make it available to your collaboration partner:

1. In the parent application from where you launched the ECAD-MCAD Collaborator (either Expedition PCB or Board Station XE), examine your design and perform any changes you want to send as part of the baseline request.

2. Choose the **Collaborate> Actions> Send Change Request** pull-down menu item or click on the Send Change Request icon in the toolbar.

   The below EDMD Collaborator dialog box is displayed.
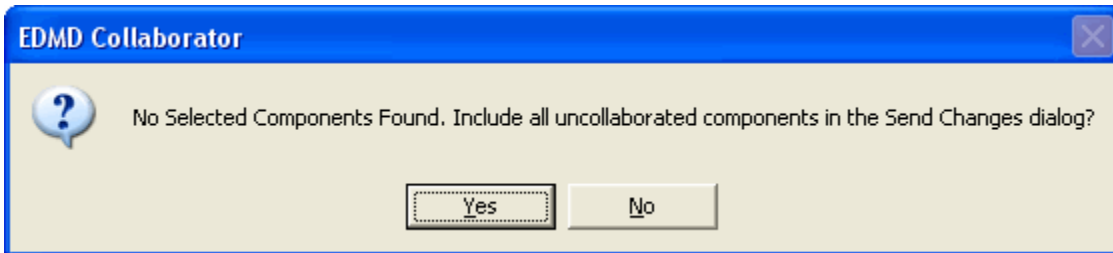
3. After clicking the **Yes** button, the Send Change Request dialog box is displayed listing all the uncollaborated components as potential send objects in their corresponding object type tab. Each tab on the Send Changes dialog shows the collaboration and information data specific to the object type it holds.

> **i** **Tip**: If you click the **No** button, no components will be displayed in the Components tab in the Send Change Request dialog box.

---

4. Select the **Baseline** check box. Notice that the dialog's name changes to Send Baseline Request dialog box. Figure 3-3

Figure 3-3. Send Baseline Request — General tab
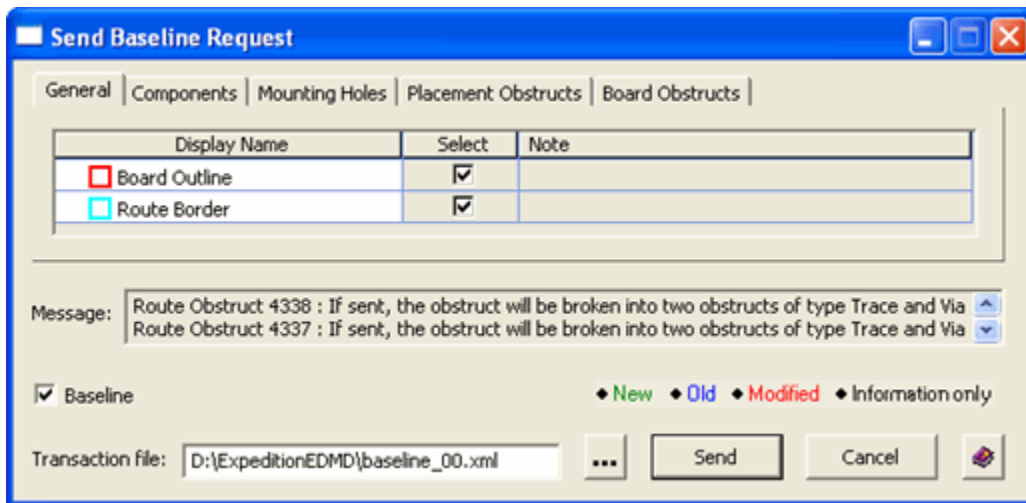
If your Baseline Request contains route obstruct of type "TraceVia", it will be sent as two different collaboration requests; one of type "Via" and the other of type "Trace". The route obstruct with type "TraceVia" will be replaced with the separate obstructs.

5. Clicking **Send** causes the following message to appear at the bottom of your ECAD-MCAD Collaboration session:

       Baseline sent

An XML baseline request file is created in the directory specified when you set up the session. Depending on how you set up your ECAD-MCAD Collaboration session, one of two things can happen:

- *If you are using file-based collaboration*, the file remains in the directory as an active request until it is viewed by your collaboration partner.

- *If you are using email-based collaboration*, the ECAD-MCAD Collaborator generates an automatic email to your collaboration partner with the XML request file as an attachment. Your partner can then save the request to a local directory before navigating to that location and showing the request in their ECAD-MCAD Collaborator session.

Showing and Responding to a Baseline Request

As a baseline request recipient, perform the following steps to show the contents within a proposed baseline request:

1. If not already open, invoke the PCB layout or mechanical design application on the design and launch the ECAD-MCAD Collaborator.

2. Choose the **Collaborate > Actions > Show Change Request** pull-down menu item or corresponding icon. The Show Change Request dialog box appears.

3. In the "Transaction file" field of the dialog box, navigate to the location where XML change files are stored and choose a *<baseline_n>.xml* file to open. If you are doing file-based collaboration, this location is the file location specified in Setup parameters dialog box. If you are doing email-based collaboration, this is the location where you saved the request that was attached to the auto-generated email you received.

   Once you have navigated to a transaction file to open, the Baseline Add Request dialog box is displayed.

_____**Note**_____

If your Baseline Request contains a route border of SIDE value "TOP", "BOTTOM" or "INNER", it will automatically be flagged as rejected. ONLY the value "ALL" is acceptable.

Figure 3-4. Baseline Add Request — General tab
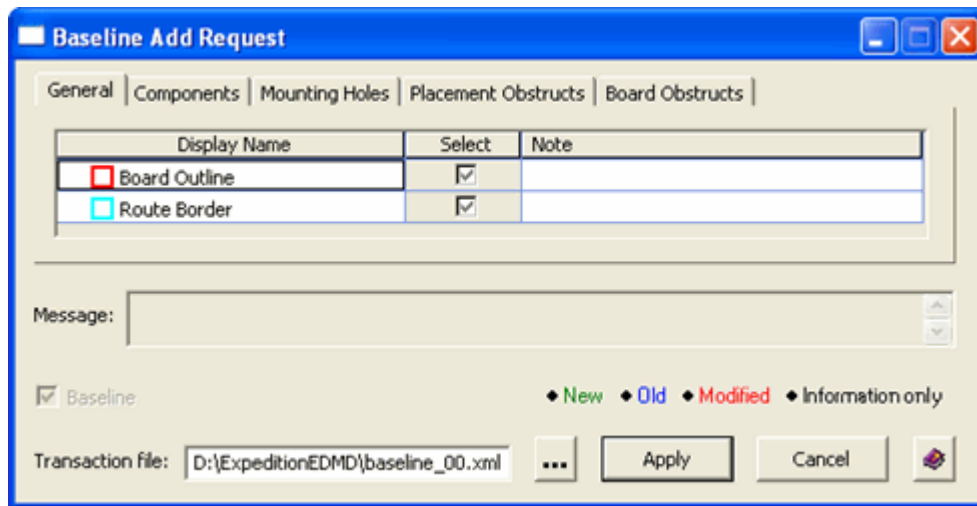
You are not allowed to modify in the baseline request. If you do not accept any of the added objects, you can simply click the **Cancel** button. Otherwise, click the **Apply** button, the **Baseline** dialog box is displayed.

Figure 3-5. Baseline dialog box
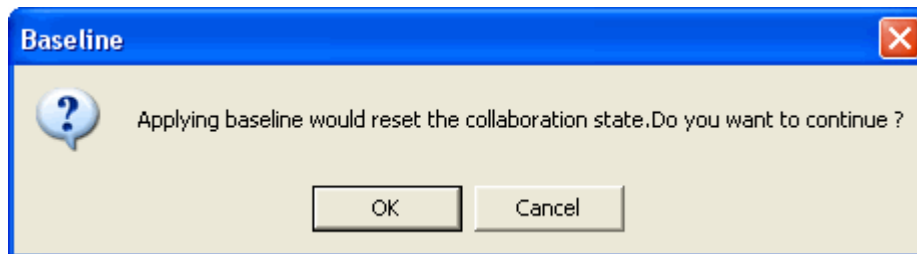
4. On clicking **OK**, any previous collaboration history will be deleted and a new collaboration state will be set from the baseline message. The following message appears at the bottom of your ECAD-MCAD Collaboration session:

```
Baseline applied...Ready to send or receive more changes
```

Creating and Sending a Change Request

Now that both you and your collaboration partner have a common understanding of the design as described in , you can perform the following steps to create a request consisting of proposed changes and make it available to your collaboration partner:

1. Activate the parent window from where you launched the ECAD-MCAD Collaborator (either Expedition PCB, Board Station XE, or the third-party mechanical design tool) and perform the action you want to capture as part of the proposed change request.

As you perform an action in the parent application (for example, moving the location of an uncollaborated object in Expedition PCB, the 3D Viewer window of the ECAD-MCAD Collaborator highlights the new location in yellow. If desired, you can use the 3D Viewing capability of ECAD-MCAD Collaborator to look at the change from several angles to make sure it is what you want before continuing to the next change. When viewing the change in ECAD-MCAD Collaborator, the last view you display before moving on to the next change in the parent application becomes part of the change request. Therefore, you should also try and end with a view in the ECAD-MCAD Collaborator that visually is best to show the change to your collaboration partner.

2. If there is more than one change in your proposal, perform the next change in the parent application.

3. When you have made all the proposed changes to include in the change request, choose the **Collaborate > Actions > Send Change Request** pull-down menu item or click on the Send Change Request icon in the toolbar.

4. The below EDMD Collaborator dialog box is displayed.
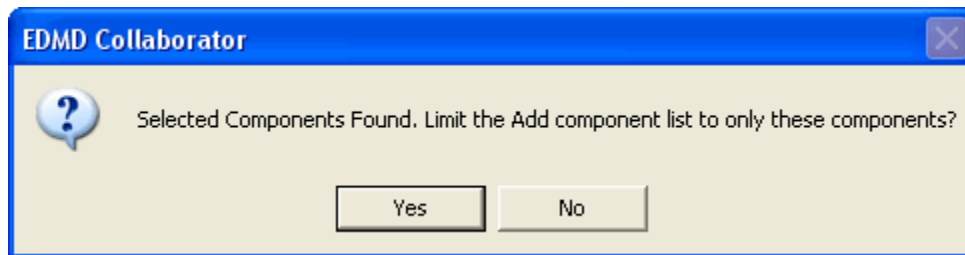
On clicking the **Yes** button, the Send Change Request dialog box is displayed listing only the selected/ modified components as potential objects in their corresponding type tab (Figure 3-6).

The Send Change Request dialog box lists all of the changes you just made in the parent application that were captured by ECAD-MCAD Collaborator into the change request.

For example, Figure 3-6 shows one change -- the addition of C2001.

Figure 3-6. Send Change Request — Components Tab
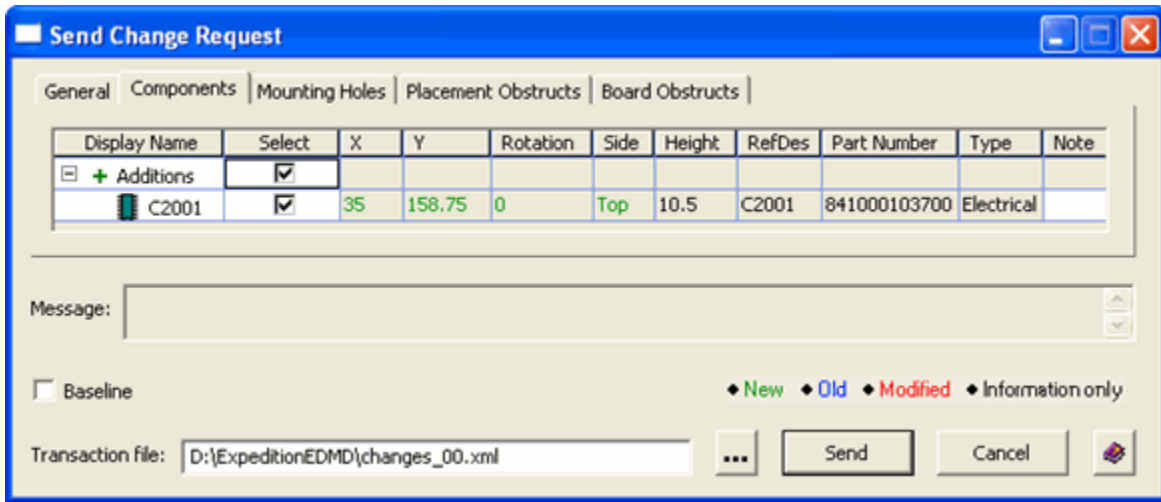
> **Note**
>
> *New* information is displayed in green, *Old* information is displayed in blue, *Modified* information is displayed in red and *data for information only* is displayed in black.

Figure 3-7 shows two changes -- the addition of Mounting Holes 31167 and 34167.

Figure 3-7. Send Change Request — Mounting Holes tab
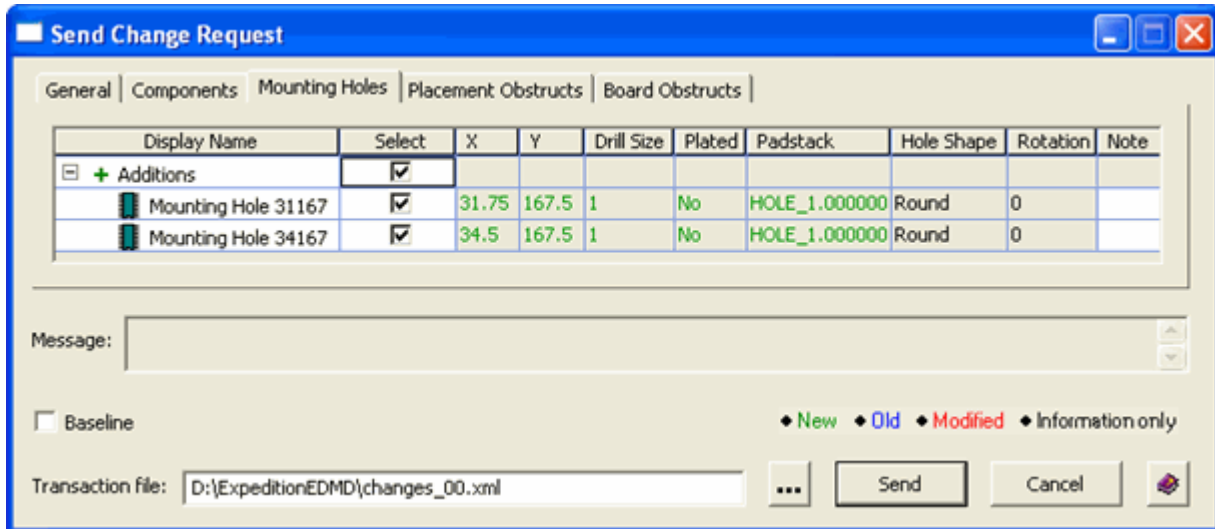
Figure 3-8 shows seven changes -- the addition of Placement Obstructs 20336, 20337, 20338, 20339, 20340, 20341 and 20342.

Figure 3-8. Send Change Request — Placement Obstructs tab
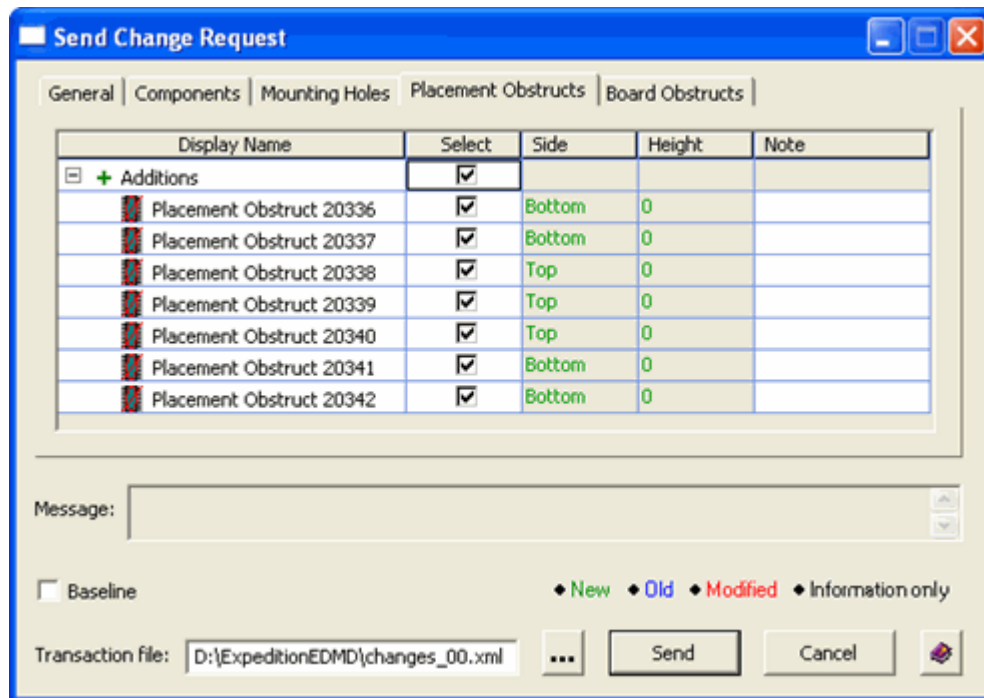
Figure 3-9 shows two changes -- the addition of Route Obstruct 20344 of type "TraceVia" and the addition of Route Obstructs 29120 of type "Via" and the deletion of Route Obstruct 28141 of type "Trace" as a result of changing the type of Route Obstruct from "Trace" to "Via".

On sending the change request, route obstruct 20344 of type "TraceVia" will be sent as two obstructs; one of type "Via" and the other of type "Trace" as in Figure 3-9. The route obstruct 20344 will be replaced.

In general; route obstruct change requests are handled as follows:

a. If your change request contains route obstruct of type "TraceVia", it will be sent as two different collaboration requests; one of type "Via" and the other of type "Trace". The route obstruct with type "TraceVia" will be replaced.

b. If you change the type of a route obstruct, it will be sent as two different collaboration requests; one as an added route obstruct "New Type" and the other as a deleted route obstruct "Old Type". If this request is rejected, the deleted route obstruct will be placed back and the added route obstruct will always appear as a potential addition in the subsequent send requests.

Figure 3-9. Send Change Request — Board Obstructs tab
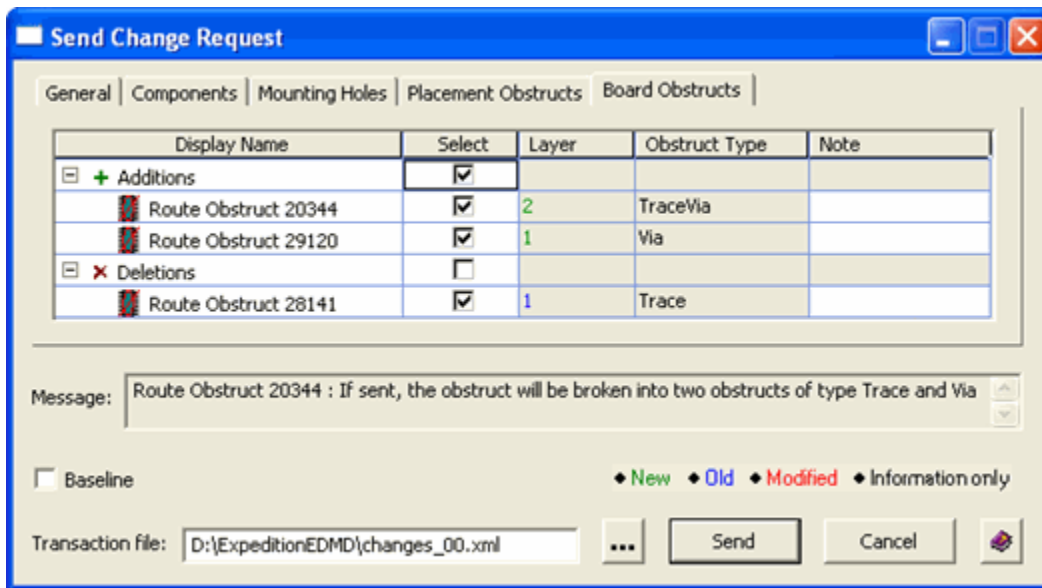
Note

Any information/ warning regarding the objects presented in the dialog box are displayed in the Message box.

Caution

If a SIDE value is received as "INNER", it will be rejected and a message will be displayed explaining the reason for that.

In the case of modified components/mounting holes/ placement obstructs, clicking the "+" symbol next to a row expands the line to show the original location data for that component/ mounting hole/ placement obstruct prior to making the change.

Note

Any modification to a component that was not part of the accepted baseline request, renders this component as a potential addition in the following send requests. i.e. it appears below the Additions node.

---

5. If desired, add text or make changes to the rows within the collaboration object changes area. For example, you could add note text with a short description that would be useful to your collaboration partner. If you decide not to include some of the changes as part of the change request, uncheck those rows.

6. Change the name assigned to your transaction file (if desired) and click **Send**. If you do not change it, the default transaction file name is *changes_00.xml* for the first request, *changes_01.xml* for the second request, and so on. You cannot use a name for a new

---

transaction request if it already exists in the directory you specified when setting up the ECAD-MCAD Collaborator session.

Clicking **Send** causes the following message to appear at the bottom of your ECAD-MCAD Collaboration session:

```
Sent changes. Awaiting response
```

Clicking the **Send** button creates an XML change request file in the directory specified when you set up the session. Depending on how you set up your ECAD-MCAD Collaboration session, one of two things can happen:

- *If you are using file-based collaboration*, the file remains in the directory as an active request until it is viewed by your collaboration partner. It is up to your collaboration partner to monitor the shared directory for any new change requests and act on them as appropriate.

- *If you are using email-based collaboration*, the ECAD-MCAD Collaborator generates an automatic email to your collaboration partner with the XML request file as an attachment. Your partner can then save the request to a local directory before navigating to that location and showing the request in their ECAD-MCAD Collaborator session.

The change initiator must now await a response from the change recipient before proposing any additional changes. Upon sending a change, the **Collaborate > Actions > Send Change Request** item is dimmed until the ECAD-MCAD Collaborator detects a response to the proposal and you acknowledge it (refer to "Processing a Response" on page 35).

> **i** **Tip**: If you know you will not be receiving a response from your collaboration partner, you can abandon your latest Send Change Request by clicking the **Abandon** button or selecting **Collaborate > Actions > Abandon** to return back from the process response state to the state where Send Changes is enabled.

Showing and Validating a Change Request

As the change recipient, perform the following steps to show the changes within a proposed change request and how they impact the design:

1. If not already open, invoke the PCB layout or mechanical design application on the design and launch the ECAD-MCAD Collaborator.

2. Choose the **Collaborate > Actions > Show Change Request** pulldown menu item or corresponding icon. The Show Change Request dialog box appears. Each tab on the Show Changes dialog shows the collaboration and information data specific to the object type it holds.

3. In the Transaction File field of the dialog box, navigate to the location where XML change files are stored and choose a *<change_n>.xml* file to open. If you are doing file-based collaboration, this location is the file location specified in Setup parameters dialog box. If you are doing email-based collaboration, this is the location where you saved the request that was attached to the auto-generated email you received.

    Once you have navigated to a transaction file to open, the Show Change Request dialog refreshes to show the collaboration objects' changes that are part of the change request (in yellow). The Show Change Request dialog box now appears virtually identical to the original Send Change Request dialog box (refer to Figure 3-6 on page 27).

Note

If a route border of SIDE value "TOP", "BOTTOM" or "INNER" is received as an added/modified route border, it will automatically be flagged as rejected and a response message will be sent.
On the other hand, when a route border is sent, make sure that the SIDE value is sent as "ALL".

---

4. Click the **OK** button on the Show Change Request dialog box. The following message appears at the bottom of your ECAD-MCAD Collaboration session:

    ```
    Showing changes in Collaborator. Validate the change
    ```

    You can then use the 3D viewing capabilities to look at the change from various different viewing angles.

    Figure 3-10 shows the top view graphic of an example change request that proposes moving a component up and to the right of the current location.

Figure 3-10. ECAD-MCAD Collaborator Window with a Change Showing
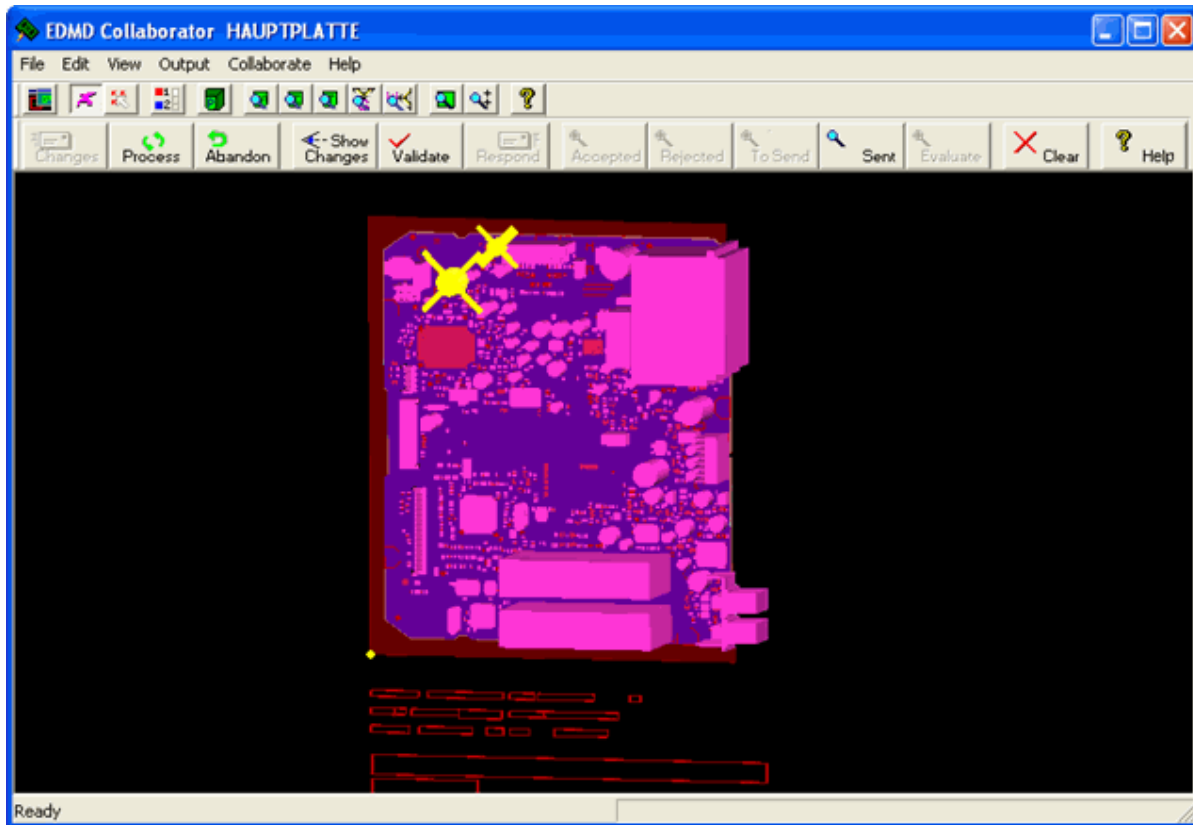
5. To see how the change request affects the open design, choose **Collaborate > Actions > Validate Change Request** (or the corresponding icon) to apply the change to the currently open design, where you can then evaluate it further within the context of the actual design (for example, by running design rule checks).

Once you have evaluated the changes contained in the request and determined their validity, you send your response back to the change initiator, as described in the next section.

_____ **Note** _____

Showing or validating changes does not change the collaboration state. The collaboration state only changes when a response is sent either accepting or rejecting the changes. Refer to Responding to a Change Request.

Responding to a Change Request

As the change recipient, perform the following steps to respond to a proposed change request:

1. Show and validate a change request as described in "Showing and Validating a Change Request" on page 30.

2. Choose the **Collaborate > Actions > Send Response** pull-down menu item or corresponding icon. The Send Response dialog box appears (Figure 3-11).

Figure 3-11. Send Response — Components Tab

Figure 3-12. Send Response — Mounting Holes Tab

Figure 3-13. Send Response — Placement Obstructs Tab

Figure 3-14. Send Response — Board Obstructs Tab

3. Place a checkmark in the Accept column for those object changes you want to accept and remove the checkmark for those object changes that you want to reject. Changes you accept appear in green, while changes you reject appear in red.
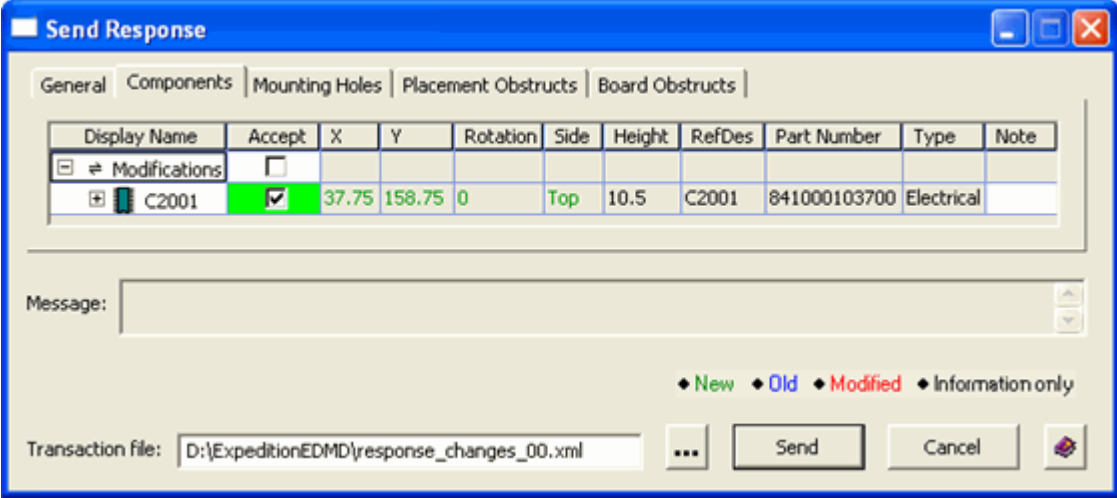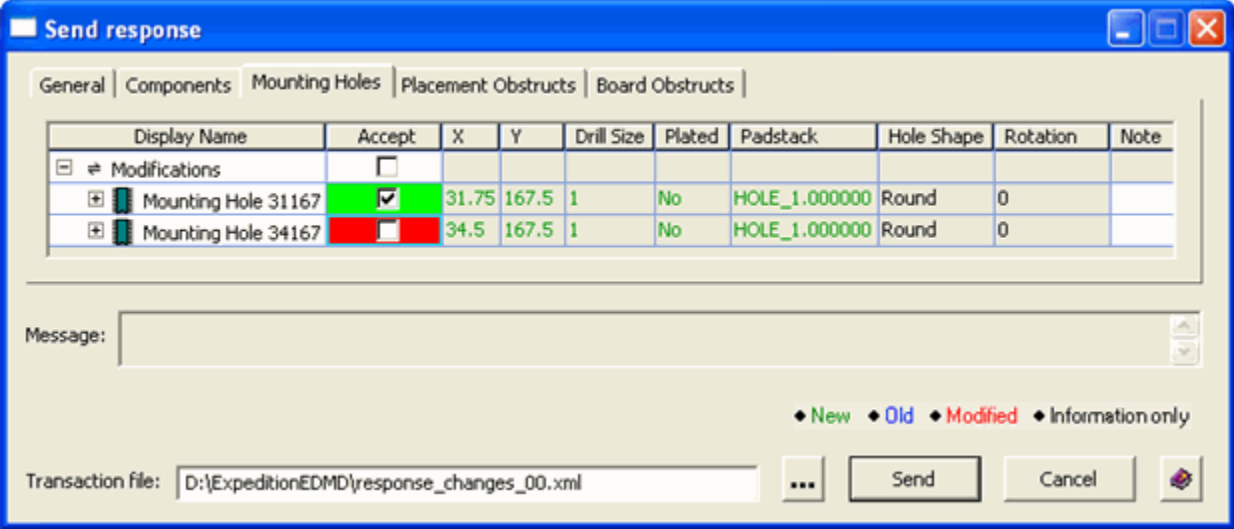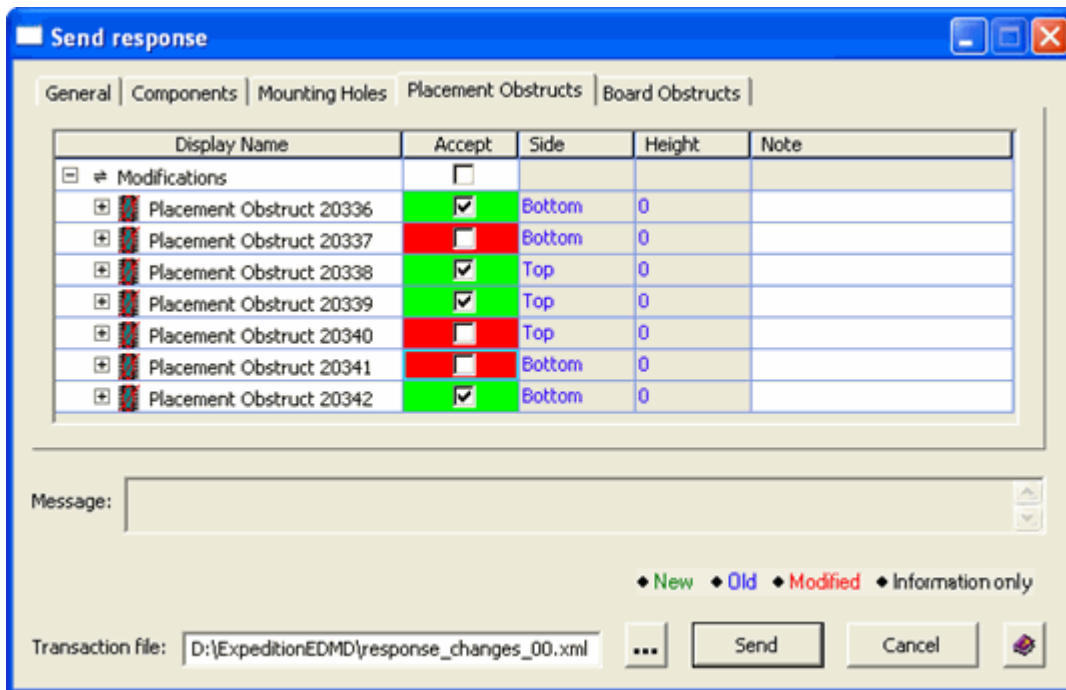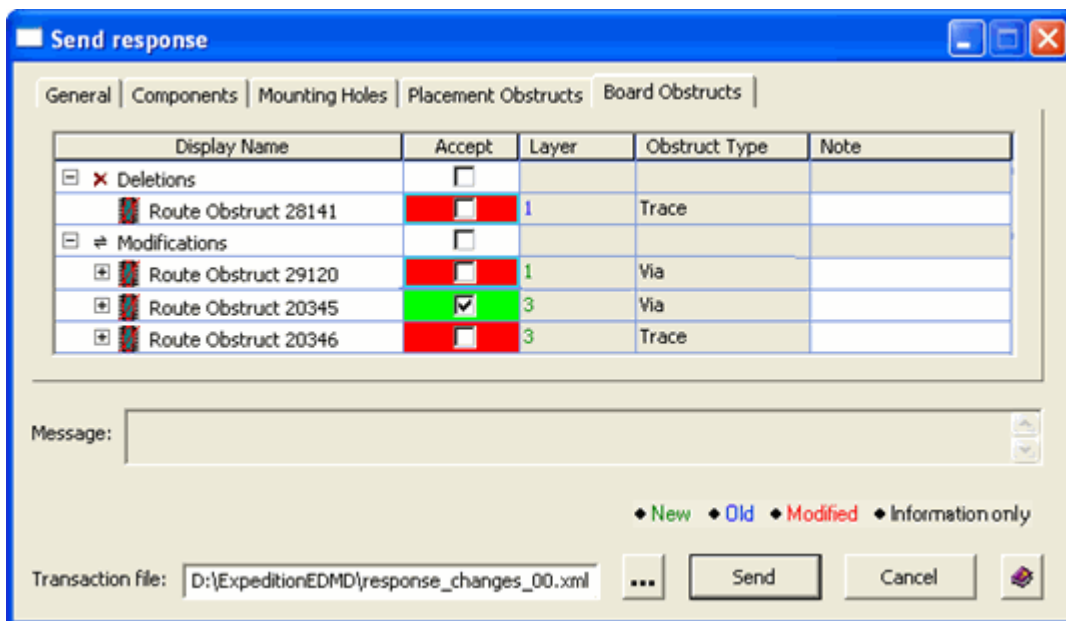
In the above example, the rejection of changing the type of a Route Obstruct from "Trace" to "Via" will result in placing back the route obstruct 28141 of type "Trace". Furthermore, the route obstruct 29120 of type "Via" will always appear as a potential addition in the subsequent send requests.

In addition, you might want to add additional text in the notes column (especially for rejected items, explaining why).

For non-component changes, place a checkmark next to the appropriate item in the Accept other changes area.

4. If desired, rename the transaction file. If you do not change the name, the default is response_changes_00.xml.

5. Click the **Send** button. The following message appears at the bottom of your ECAD-MCAD Collaboration session:

```
Response sent. Ready to send or receive more changes
```

The change initiator must now process the response, as described in the next section.

Processing a Response

Once the change recipient has responded to your proposed change request, perform the following steps to process their response:

1. Choose the **Collaborate > Actions > Process Response** pull-down menu item (or icon). The Process Response dialog box appears.

   Note that before the change recipient responded to your request, the **Process Response** item was dimmed. After the recipient responds to your request, the **Process Response** item becomes active.

2. In the Transaction File field of the dialog box, navigate to the location where XML change files are stored and choose the *<response_changes_n>.xml* file corresponding the change request you initiated earlier.

3. View the response.

_____**Note**_____
Add objects that were rejected by the change request recipient will still show up as potential add objects for future send requests.

4. If you accept the response, click **OK**. Otherwise, click **Cancel** and repeat the request creation process to generate a new request with changes that act as a counter-proposal.

5. The following message appears at the bottom of your ECAD-MCAD Collaboration session when you click the OK button:

```
Transaction completed. Ready to send or receive more changes.
```

Sending a Baseline Request during a collaboration session

During a collaboration session, if the design's current collaboration state is damaged or out of sync for any reason, EDMD Collaborator allows you to send a baseline request by performing the following steps:

1. Open the Send Change Request dialog box by doing the same steps in "Sending a Baseline Request" on page 22.

2. Select the **Baseline** check box. Notice that the dialog's name changes to Send Baseline Request dialog box. Figure 3-15

   Once you have selected the baseline checkbox, you are not allowed to select any data. The baseline send request will include all the data in the current collaboration model at that time.

Figure 3-15. Send Baseline Request — Components tab
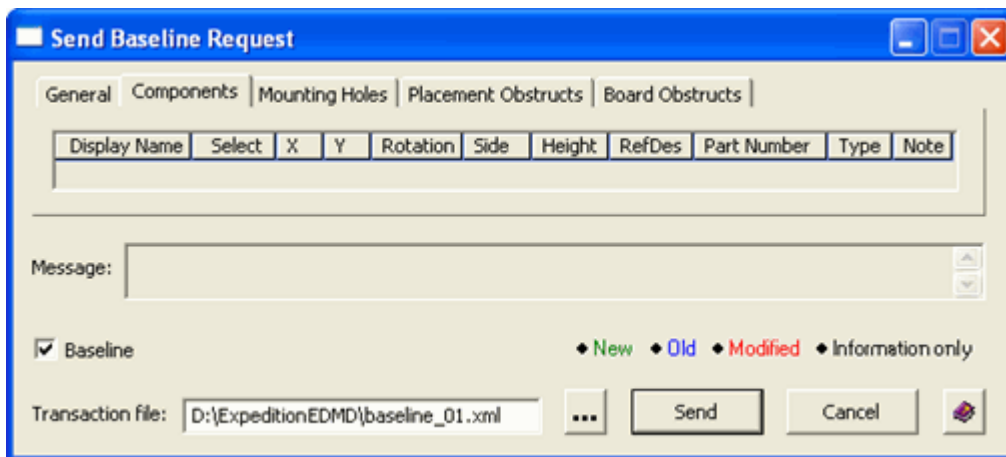
Clicking **Send** causes the following message to appear at the bottom of your ECAD-MCAD Collaboration session:

```
Baseline sent
```

As a baseline request recipient, perform the same steps in Showing and Responding to a Baseline Request.

Figure 3-16. Baseline Add Request — Components tab
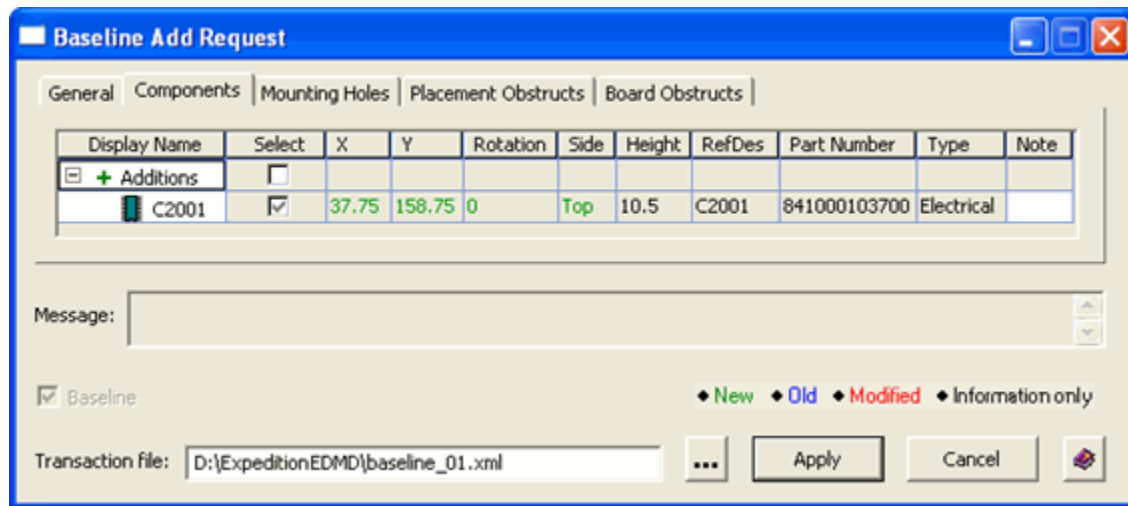
Graphically Displaying Requests in Different States

The items on the **Collaborate > Display Requests** pull-down menu (and corresponding icons) visually display the components/ placement obstruct affected by change requests and their various request states, using the following color coding:

- Accepted changes appear in green

- Rejected changes appear in red

- Changes that still require evaluation appear in yellow

Changes are cumulative. For example, Figure 3-17 shows the graphic display area where accepted (green) changes are shown. You can then use the 3D viewing capabilities to look at the change from various different viewing angles.

Figure 3-17. An Example Graphic with Accepted and Rejected Changes
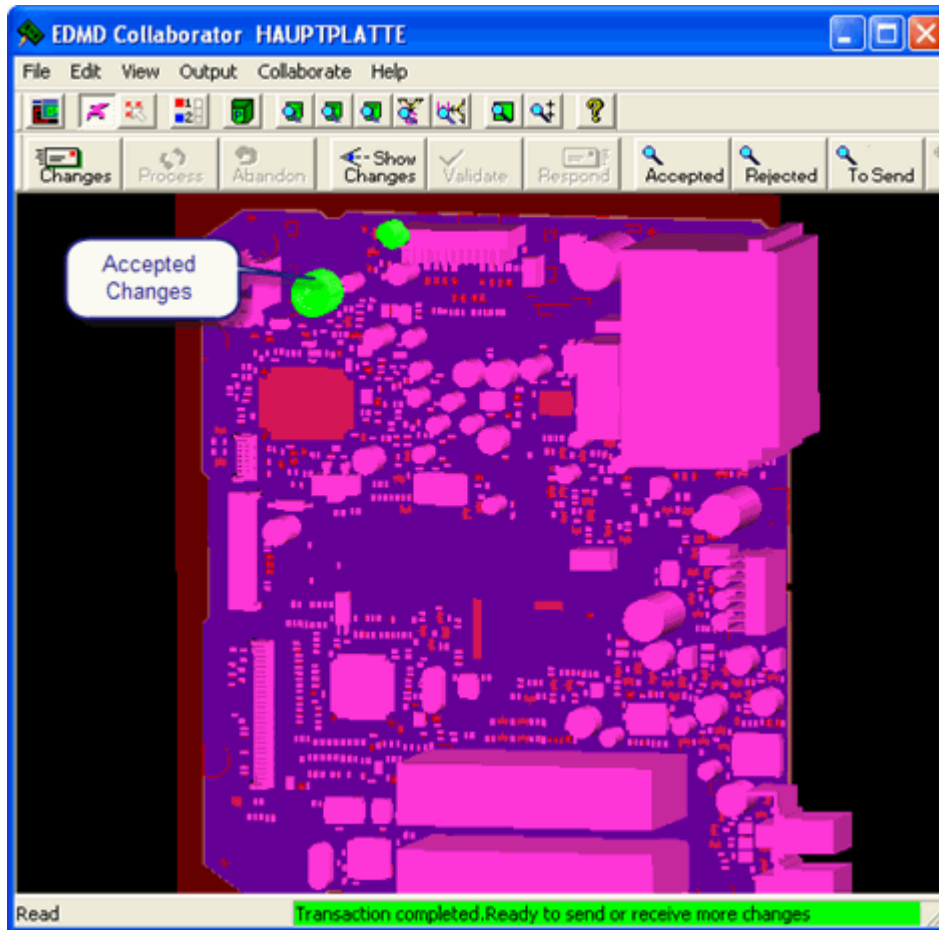
The highlighted changes remain on the graphic until you clear the changes using **Collaborate > Clear Graphics** or the corresponding icon.

Controlling Which States to Display

To control which states to display in the graphic area, choose **View > Display Control** to show the display control window and then bring the EDMD tab to the front (Figure 3-18). Checking an item allows that state to be highlighted in the graphic window, while unchecking an item prevents that state from being highlighted in the graphic window.

In addition, you can control the color in which the ECAD-MCAD Collaborator displays an item in the graphic window by selecting the name of the item in the EDMD tab and using the right mouse button.

Figure 3-18. EDMD Display Control Tab
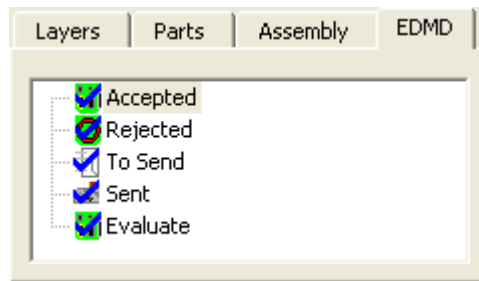
Closing the ECAD-MCAD Collaborator

On closing the EDMD Collaborator without saving the changes after a collaboration session (Creating and Sending a Change Request, Showing and Validating a Change Request and Processing a Response) a message box is displayed asking whether to save the collaboration state or not.

This message also appears on reloading the design in either Expedition PCB or Board Station XE. Below are the changes that cause Expedition to reload the design:

- Moving the board origin

- Renumbering all the RefDes names on electrical components

- Changing the layer stackup
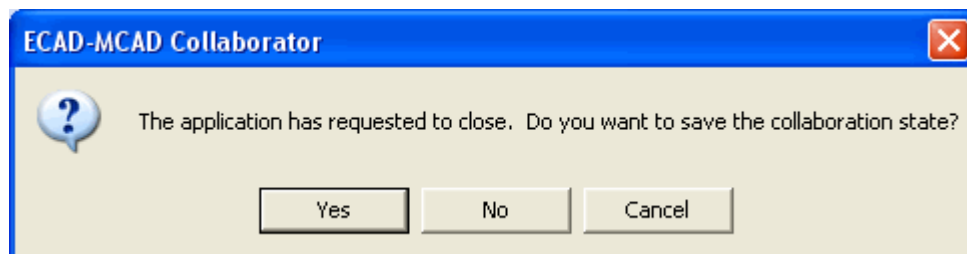
If you click the **Yes** button, both the collaboration state and the design will be saved. If you click the **No** button, the collaboration state will be saved but the design will not. The differences will appear as potential changes in future Show Changes commands. If you click the **Cancel** button, exiting the collaboration will be cancelled and you can continue to where you can exit clearly.

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Third-Party Information

This section provides information on open source and third-party software that may be included in the ECAD-MCAD Collaborator product.

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7. **AUTOMATIC CHECK FOR UPDATES; PRIVACY.** Technological measures in Software may communicate with servers of Mentor Graphics or its contractors for the purpose of checking for and notifying the user of updates and to ensure that the Software in use is licensed in compliance with this Agreement. Mentor Graphics will not collect any personally identifiable data in this process and will not disclose any data collected to any third party without the prior written consent of Customer, except to Mentor Graphics' outside attorneys or as may be required by a court of competent jurisdiction.

8. **LIMITED WARRANTY.**

8.1. Mentor Graphics warrants that during the warranty period its standard, generally supported Products, when properly installed, will substantially conform to the functional specifications set forth in the applicable user manual. Mentor Graphics does not warrant that Products will meet Customer's requirements or that operation of Products will be uninterrupted or error free. The warranty period is 90 days starting on the 15th day after delivery or upon installation, whichever first occurs. Customer must notify Mentor Graphics in writing of any nonconformity within the warranty period. For the avoidance of doubt, this warranty applies only to the initial shipment of Software under an Order and does not renew or reset, for example, with the delivery of (a) Software updates or (b) authorization codes or alternate Software under a transaction involving Software re-mix. This warranty shall not be valid if Products have been subject to misuse, unauthorized modification or improper installation. MENTOR GRAPHICS' ENTIRE LIABILITY AND CUSTOMER'S EXCLUSIVE REMEDY SHALL BE, AT MENTOR GRAPHICS' OPTION, EITHER (A) REFUND OF THE PRICE PAID UPON RETURN OF THE PRODUCTS TO MENTOR GRAPHICS OR (B) MODIFICATION OR REPLACEMENT OF THE PRODUCTS THAT DO NOT MEET THIS LIMITED WARRANTY, PROVIDED CUSTOMER HAS OTHERWISE COMPLIED WITH THIS AGREEMENT. MENTOR GRAPHICS MAKES NO WARRANTIES WITH RESPECT TO: (A) SERVICES; (B) PRODUCTS PROVIDED AT NO CHARGE; OR (C) BETA CODE; ALL OF WHICH ARE PROVIDED "AS IS."

8.2. THE WARRANTIES SET FORTH IN THIS SECTION 8 ARE EXCLUSIVE. NEITHER MENTOR GRAPHICS NOR ITS LICENSORS MAKE ANY OTHER WARRANTIES EXPRESS, IMPLIED OR STATUTORY, WITH RESPECT TO PRODUCTS PROVIDED UNDER THIS AGREEMENT. MENTOR GRAPHICS AND ITS LICENSORS SPECIFICALLY DISCLAIM ALL IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF INTELLECTUAL PROPERTY.

9. **LIMITATION OF LIABILITY.** EXCEPT WHERE THIS EXCLUSION OR RESTRICTION OF LIABILITY WOULD BE VOID OR INEFFECTIVE UNDER APPLICABLE LAW, IN NO EVENT SHALL MENTOR GRAPHICS OR ITS LICENSORS BE LIABLE FOR INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS OR SAVINGS) WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY, EVEN IF MENTOR GRAPHICS OR ITS LICENSORS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL MENTOR GRAPHICS' OR ITS LICENSORS' LIABILITY UNDER THIS AGREEMENT EXCEED THE AMOUNT RECEIVED FROM CUSTOMER FOR THE HARDWARE, SOFTWARE LICENSE OR SERVICE GIVING RISE TO THE CLAIM. IN THE CASE WHERE NO AMOUNT WAS PAID, MENTOR GRAPHICS AND ITS LICENSORS SHALL HAVE NO LIABILITY FOR ANY DAMAGES WHATSOEVER. THE PROVISIONS OF THIS SECTION 9 SHALL SURVIVE THE TERMINATION OF THIS AGREEMENT.

10. **HAZARDOUS APPLICATIONS.** CUSTOMER ACKNOWLEDGES IT IS SOLELY RESPONSIBLE FOR TESTING ITS PRODUCTS USED IN APPLICATIONS WHERE THE FAILURE OR INACCURACY OF ITS PRODUCTS MIGHT RESULT IN DEATH OR PERSONAL INJURY ("HAZARDOUS APPLICATIONS"). NEITHER MENTOR GRAPHICS NOR ITS LICENSORS SHALL BE LIABLE FOR ANY DAMAGES RESULTING FROM OR IN CONNECTION WITH THE USE OF MENTOR GRAPHICS PRODUCTS IN OR FOR HAZARDOUS APPLICATIONS. THE PROVISIONS OF THIS SECTION 10 SHALL SURVIVE THE TERMINATION OF THIS AGREEMENT.

11. **INDEMNIFICATION.** CUSTOMER AGREES TO INDEMNIFY AND HOLD HARMLESS MENTOR GRAPHICS AND ITS LICENSORS FROM ANY CLAIMS, LOSS, COST, DAMAGE, EXPENSE OR LIABILITY, INCLUDING ATTORNEYS' FEES, ARISING OUT OF OR IN CONNECTION WITH THE USE OF PRODUCTS AS DESCRIBED IN SECTION 10. THE PROVISIONS OF THIS SECTION 11 SHALL SURVIVE THE TERMINATION OF THIS AGREEMENT.

12. **INFRINGEMENT.**

12.1. Mentor Graphics will defend or settle, at its option and expense, any action brought against Customer in the United States, Canada, Japan, or member state of the European Union which alleges that any standard, generally supported Product acquired by Customer hereunder infringes a patent or copyright or misappropriates a trade secret in such jurisdiction. Mentor Graphics will pay costs and damages finally awarded against Customer that are attributable to the action. Customer understands and agrees that as conditions to Mentor Graphics' obligations under this section Customer must: (a) notify Mentor Graphics promptly in writing of the action; (b) provide Mentor Graphics all reasonable information and assistance

to settle or defend the action; and (c) grant Mentor Graphics sole authority and control of the defense or settlement of the action.

12.2. If a claim is made under Subsection 12.1 Mentor Graphics may, at its option and expense, (a) replace or modify the Product so that it becomes noninfringing; (b) procure for Customer the right to continue using the Product; or (c) require the return of the Product and refund to Customer any purchase price or license fee paid, less a reasonable allowance for use.

12.3. Mentor Graphics has no liability to Customer if the action is based upon: (a) the combination of Software or hardware with any product not furnished by Mentor Graphics; (b) the modification of the Product other than by Mentor Graphics; (c) the use of other than a current unaltered release of Software; (d) the use of the Product as part of an infringing process; (e) a product that Customer makes, uses, or sells; (f) any Beta Code or Product provided at no charge; (g) any software provided by Mentor Graphics' licensors who do not provide such indemnification to Mentor Graphics' customers; or (h) infringement by Customer that is deemed willful. In the case of (h), Customer shall reimburse Mentor Graphics for its reasonable attorney fees and other costs related to the action.

12.4. THIS SECTION 12 IS SUBJECT TO SECTION 9 ABOVE AND STATES THE ENTIRE LIABILITY OF MENTOR GRAPHICS AND ITS LICENSORS FOR DEFENSE, SETTLEMENT AND DAMAGES, AND CUSTOMER'S SOLE AND EXCLUSIVE REMEDY, WITH RESPECT TO ANY ALLEGED PATENT OR COPYRIGHT INFRINGEMENT OR TRADE SECRET MISAPPROPRIATION BY ANY PRODUCT PROVIDED UNDER THIS AGREEMENT.

13. **TERMINATION AND EFFECT OF TERMINATION.** If a Software license was provided for limited term use, such license will automatically terminate at the end of the authorized term.

13.1. Mentor Graphics may terminate this Agreement and/or any license granted under this Agreement immediately upon written notice if Customer: (a) exceeds the scope of the license or otherwise fails to comply with the licensing or confidentiality provisions of this Agreement, or (b) becomes insolvent, files a bankruptcy petition, institutes proceedings for liquidation or winding up or enters into an agreement to assign its assets for the benefit of creditors. For any other material breach of any provision of this Agreement, Mentor Graphics may terminate this Agreement and/or any license granted under this Agreement upon 30 days written notice if Customer fails to cure the breach within the 30 day notice period. Termination of this Agreement or any license granted hereunder will not affect Customer's obligation to pay for Products shipped or licenses granted prior to the termination, which amounts shall be payable immediately upon the date of termination.

13.2. Upon termination of this Agreement, the rights and obligations of the parties shall cease except as expressly set forth in this Agreement. Upon termination, Customer shall ensure that all use of the affected Products ceases, and shall return hardware and either return to Mentor Graphics or destroy Software in Customer's possession, including all copies and documentation, and certify in writing to Mentor Graphics within ten business days of the termination date that Customer no longer possesses any of the affected Products or copies of Software in any form.

14. **EXPORT.** The Products provided hereunder are subject to regulation by local laws and United States government agencies, which prohibit export or diversion of certain products and information about the products to certain countries and certain persons. Customer agrees that it will not export Products in any manner without first obtaining all necessary approval from appropriate local and United States government agencies.

15. **U.S. GOVERNMENT LICENSE RIGHTS.** Software was developed entirely at private expense. All Software is commercial computer software within the meaning of the applicable acquisition regulations. Accordingly, pursuant to US FAR 48 CFR 12.212 and DFAR 48 CFR 227.7202, use, duplication and disclosure of the Software by or for the U.S. Government or a U.S. Government subcontractor is subject solely to the terms and conditions set forth in this Agreement, except for provisions which are contrary to applicable mandatory federal laws.

16. **THIRD PARTY BENEFICIARY.** Mentor Graphics Corporation, Mentor Graphics (Ireland) Limited, Microsoft Corporation and other licensors may be third party beneficiaries of this Agreement with the right to enforce the obligations set forth herein.

17. **REVIEW OF LICENSE USAGE.** Customer will monitor the access to and use of Software. With prior written notice and during Customer's normal business hours, Mentor Graphics may engage an internationally recognized accounting firm to review Customer's software monitoring system and records deemed relevant by the internationally recognized accounting firm to confirm Customer's compliance with the terms of this Agreement or U.S. or other local export laws. Such review may include FLEXlm or FLEXnet (or successor product) report log files that Customer shall capture and provide at Mentor Graphics' request. Customer shall make records available in electronic format and shall fully cooperate with data gathering to support the license review. Mentor Graphics shall bear the expense of any such review unless a material non-compliance is revealed. Mentor Graphics shall treat as confidential information all information gained as a result of any request or review and shall only use or disclose such information as required by law or to enforce its rights under this Agreement. The provisions of this Section 17 shall survive the termination of this Agreement.

18. **CONTROLLING LAW, JURISDICTION AND DISPUTE RESOLUTION.** The owners of certain Mentor Graphics intellectual property licensed under this Agreement are located in Ireland and the United States. To promote consistency around the world, disputes shall be resolved as follows: excluding conflict of laws rules, this Agreement shall be governed by and construed under the laws of the State of Oregon, USA, if Customer is located in North or South America, and the laws of Ireland if Customer is located outside of North or South America. All disputes arising out of or in relation to this Agreement shall be submitted to the exclusive jurisdiction of the courts of Portland, Oregon when the laws of Oregon apply, or Dublin, Ireland when the laws of Ireland apply. Notwithstanding the foregoing, all disputes in Asia arising out of or in relation to this Agreement shall be resolved by arbitration in Singapore before a single arbitrator to be appointed by the chairman of the Singapore International

Arbitration Centre ("SIAC") to be conducted in the English language, in accordance with the Arbitration Rules of the SIAC in effect at the time of the dispute, which rules are deemed to be incorporated by reference in this section. This section shall not restrict Mentor Graphics' right to bring an action against Customer in the jurisdiction where Customer's place of business is located. The United Nations Convention on Contracts for the International Sale of Goods does not apply to this Agreement.

19. **SEVERABILITY.** If any provision of this Agreement is held by a court of competent jurisdiction to be void, invalid, unenforceable or illegal, such provision shall be severed from this Agreement and the remaining provisions will remain in full force and effect.

20. **MISCELLANEOUS.** This Agreement contains the parties' entire understanding relating to its subject matter and supersedes all prior or contemporaneous agreements, including but not limited to any purchase order terms and conditions. Some Software may contain code distributed under a third party license agreement that may provide additional rights to Customer. Please see the applicable Software documentation for details. This Agreement may only be modified in writing by authorized representatives of the parties. Waiver of terms or excuse of breach must be in writing and shall not constitute subsequent consent, waiver or excuse.

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