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Using ADS Design Kits

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Using ADS Design Kits

About Using ADS Design Kits	7
Using the ADS Design Kit Tools	10

About Using ADS Design Kits

Advanced Design System (ADS) from Agilent Technologies is a tool used by engineers for a variety of design applications, such as RFIC, MMIC, System level, Hybrid or Board level design. In order to effectively use the design environment and to take advantage of its powerful simulation capabilities, designers must have a library of components that are linked to model files or simulation data.

For RFIC designers, the components and models are typically distributed by a foundry in the form of a *design kit*. A unique design kit is created for each process and each CAD tool. This kit is given to the foundry customer to use when designing their circuit.

To help RFIC designers become more successful with our electronic design automation (EDA) software, Agilent Technologies has been working with popular foundries to provide ADS components and translated model files for distribution by the foundry to the IC designer. Many customers are also creating design kits themselves.

Design kits in ADS are not beneficial only to RFIC designers. This library structure can be used for any technology or process to package and distribute a reusable set of components. With the information provided in this document, you can now easily use your ADS Design Kits in ADS.

The intent of this documentation is to provide instructions for unzipping, adding and setting up ADS Design Kits that will be used in your designs.

The ADS Design Kit Infrastructure has been developed and tested to provide you with a standard method for building, testing and using ADS Design Kits within Advanced Design System. If you are interested in developing your own ADS Design Kit, refer to the ADS Design Kit Development documentation.

The content of this document addresses the configuration of ADS Design Kits for ADS Front End and Front to Back design flows. For more information, refer to [ADS Design Flows](#).

ADS Design Flows

Advanced Design System is a flexible tool that can be used on its own or in conjunction with other CAE tools in a variety of *design flows*. An engineer using the ADS *Front to Back* design flow enters a design in the ADS schematic editor and uses the ADS simulator for analysis. The layout is created in ADS by automatically generating it from the schematic or by manually creating the layout, or a combination of the two processes. Export tools are provided to transfer the layout to third party manufacturing tools.

The *GoldenGate* simulator for Cadence environment provides a tightly integrated EDA solution that enables RF/mixed-signal IC designers to simulate their designs directly in the Cadence environment using the *GoldenGate* RF simulator. This enables the RF/MS IC customer to take advantage of complementary features provided by both Agilent Technologies and Cadence Design Systems. For more information on GoldenGate, refer to the Agilent EEs of EDA Home Page at

<http://eesof.tm.agilent.com/>

An engineer using the ADS *Front End* design flow enters a design in the ADS schematic editor and uses the ADS simulator for analysis. The design is then re-entered in a separate layout tool. To validate the integrity of the layout, the ADS Netlist Exporter is used to create a netlist for layout vs. schematic comparison. For more information on Front End Design Flow, refer to the ADS *Netlist Exporter* documentation.

An engineer using the RFIC Dynamic Link Flow enters a design in Cadence Virtuoso Schematic Capture. The design is then dynamically linked via inter-process communication (IPC) for simulation in ADS. For more information on the RFIC Dynamic Link Flow, refer to Design Kit Development for RFIC Dynamic Link in the ADS Design Kit Development documentation.

Minimum Requirements

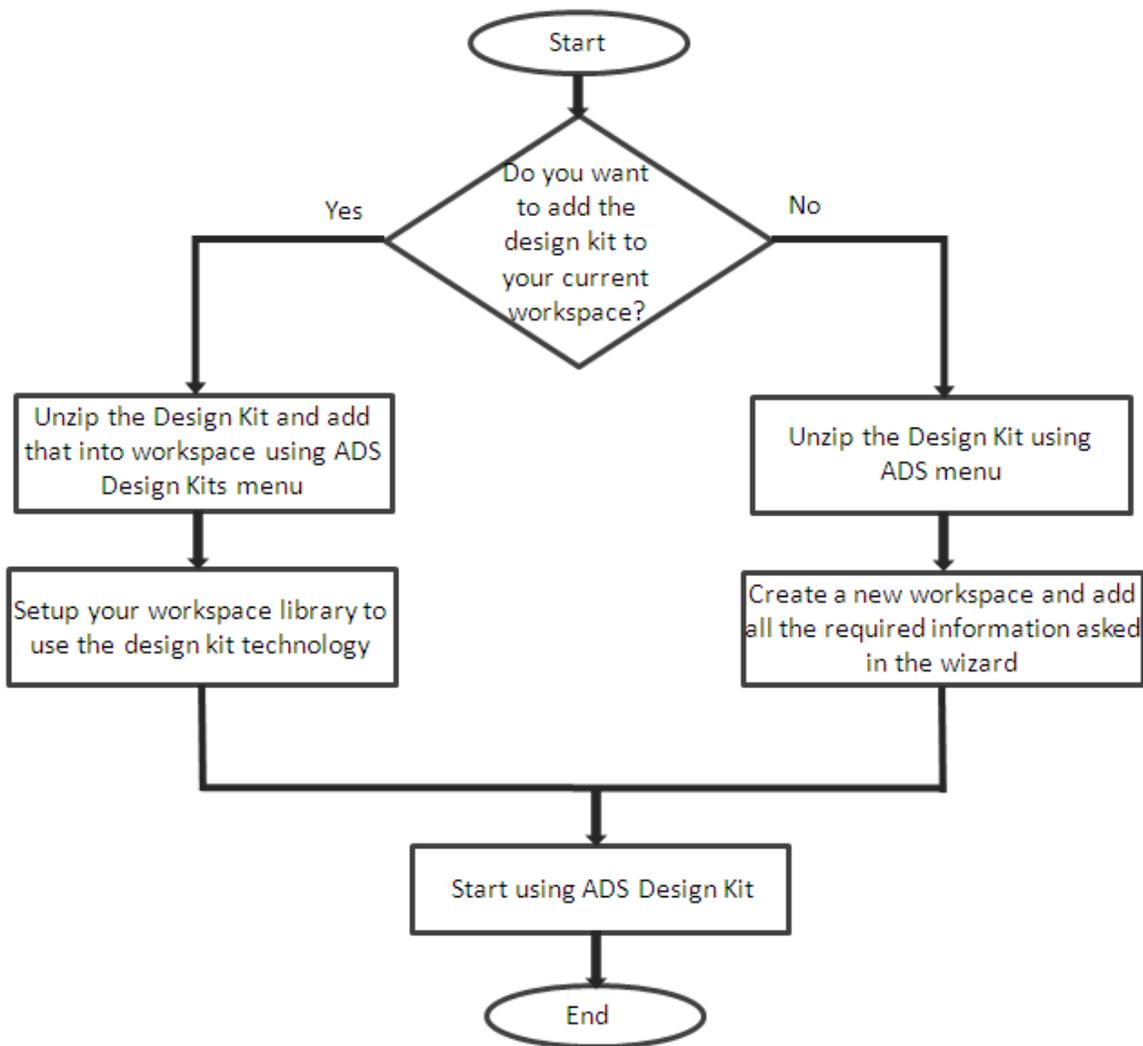
The minimum requirement for using the design kit tools described in this document is Advanced Design System 2011.10 or later.

ADS Design Kit development has progressed to provide standards that enable ease of adding to workspace and use in Advanced Design System. If you have an old design kit (compatible with ADS2009U1 or earlier versions) that you would like to modify to function with the new ADS (ADS2011.01 onwards) design kit tools, refer to the ADS ADS 2011 PDK Upgrade documentation. If you are not comfortable creating or modifying your own ADS Design Kits, contact Agilent EEs of EDA's Solution Services department or consult your Agilent Technologies representative.

ADS Design Kit Tools Overview

Getting started is a simple process, as shown in the following figure [ADS Design Kit Process](#).

Using ADS Design Kits



ADS Design Kit Process

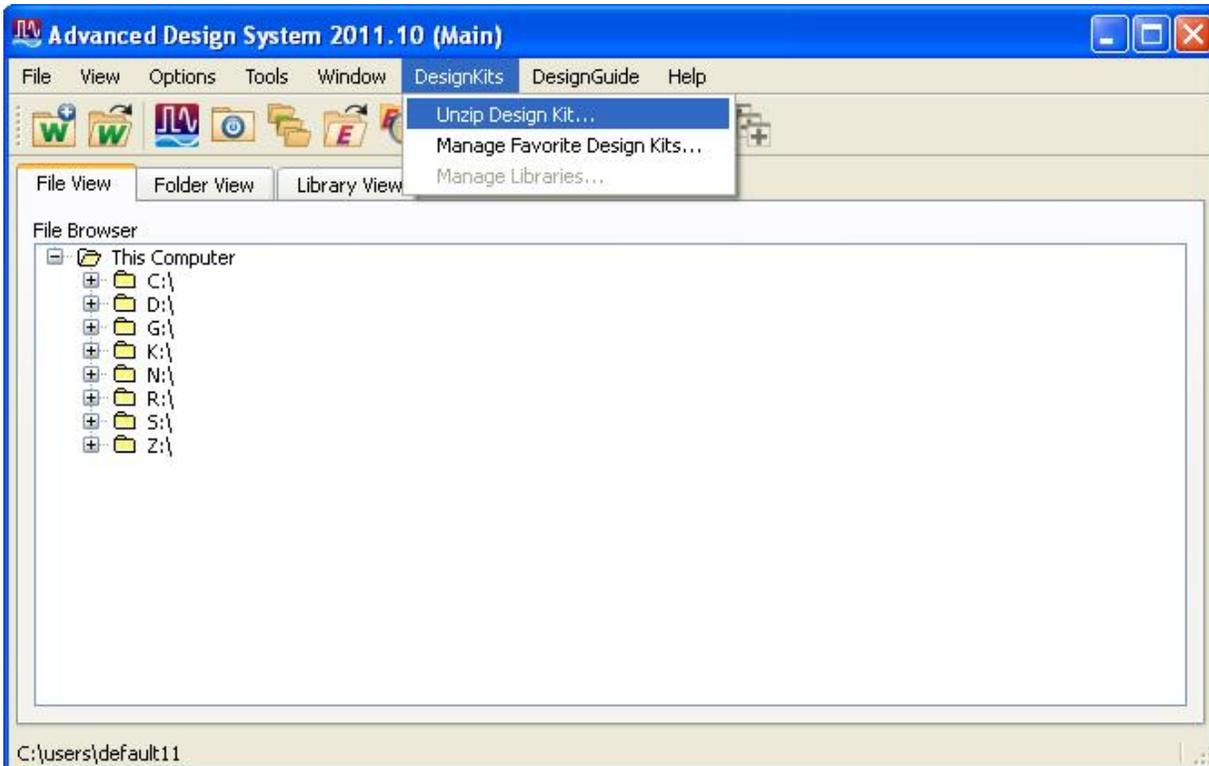
For detailed information on using the ADS design kit tools, refer to *Using the ADS Design Kit Tools*.

Design Kit Customer Support

If you encounter problems using a design kit that was obtained from a foundry or other distributor, you should first contact the design kit distributor. If the design kit developer determines that the problem is not with the design kit, they can forward the design kit to the Agilent EEsof EDA customer support department and work with Agilent Technologies to determine the problem. Please do not contact the Agilent EEsof EDA customer support department directly to report a problem with a design kit. This is because Agilent Technologies will not have access to the design kit unless it comes directly from the distributor.

Using the ADS Design Kit Tools

This topic describes how to use the various tools provided in the **DesignKits** pull-down menu. The ADS **DesignKits** menu appears in your ADS *Main* window when you launch Advanced Design System.



Where to Add a Design Kit

A design kit is a self contained library. It is a set of directories and files in a standard format. To support large companies with complex systems of CAD tools and design kits from many different vendors, as well as individual engineers on stand-alone systems, a design kit that is to be used in ADS can be placed anywhere on your system. It does not have to be connected to the ADS software installation. If your company does not already have a specified location to store design kits, it is recommended that a directory be created to hold all design kits in one location.

From ADS2011 onwards, Design Kits are no longer installed or uninstalled as they were in prior ADS releases. Just like libraries, they are added or removed from the workspace. Hence, PDKs are used at the workspace level in ADS 2011. If a kit is added to a workspace, and a new workspace is opened, then, that kit won't be accessible anymore, unless the previous workspace is opened again.

Note

If an archived workspace that uses a design kit, needs to be used on another machine, the lib.defs of the workspace must be modified on that machine, so that, it now starts looking for the kit at the correct location (as per this machine). For details on how to edit the lib.defs of the workspace, see [Manage Libraries](#).

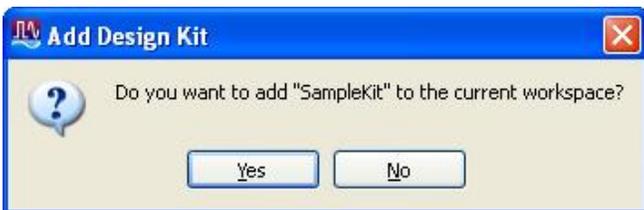
Using the DesignKits Menus

Unzip Design Kit

First menu item of the *DesignKits* menu enables you to unzip a new design kit. If your new design kit is currently packaged as a .zip file, you will need to unzip the design kit in the appropriate location. If your design kit has already been unpackaged, skip to [Manage Libraries](#). If your design kit has not been unpackaged and is not distributed as a .zip file, refer to the installation instructions provided with the kit.

To unzip your new design kit:

1. Click **Unzip Design Kit**. Select the zipped kit.
2. Now, select the location where you would like to unzip this zipped kit.
3. If you have a workspace open, you will receive a message asking if you would like to add the unzipped design kit to the workspace. Select 'yes' or 'no'. You may also be asked to provide a name by which your design kit would be added to the workspace.



A new directory containing your design kit is created in the location that was specified. This new directory contains several sub-directories and files, typically including:

- circuit
- PDK's Main Library
- doc
- lib.defs file

Depending on your design kit, there may be additional sub-directories beyond those listed above. For detailed information on the contents of design kit directories, refer to the *ADS Design Kit Development* documentation.

Manage Favorite Design Kits

When a kit is added to a workspace using the 'New Workspace' wizard, some details of the kit get added to this window.

- Name - This is the name given to the Design Kit while adding it to the workspace. By default, this is the name given in the variable `DESIGN_KIT_NAME` in the `eesof_lib.cfg` file.
- Version - This field shows the library's name and version in the form `<LibName>=<Version>`. The library name is the user-defined name, which defaults to being the library name. The Version is picked up from the `eesof_lib.cfg` `VERSION` variable. This number is typically defined by the design kit developer and is used for tracking the design kit version for support. This field should remain as the vendor has set it and should not be modified. If the version number was not defined, you may

see a *NONE* in this field. If the `eesof_lib.cfg` file doesn't exist or the Kit is not ADS2011 compatible then you will see a *Not Found* text in this field.

Note

The version data can be any string of characters with the exception of the vertical bar.

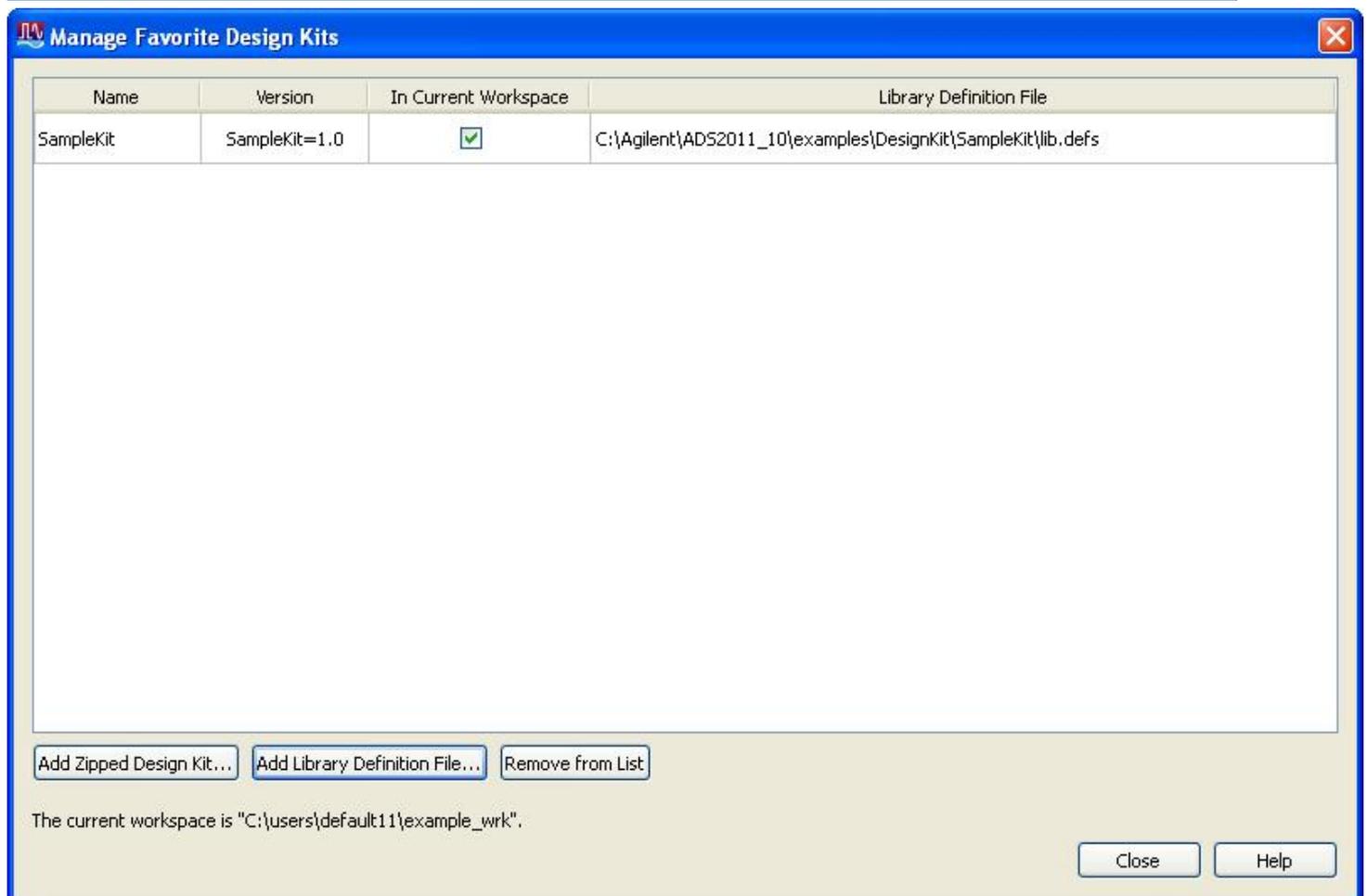
- **In Current Workspace** - This field is checked if the kit is present in the current workspace. If the user unchecks this, the kit gets removed from the current workspace. If no workspace is open, this field is shown as --.
- **Library Definition File** - This field contains the path to the `.defs` file of the design kit.

The user can use this dialog box to add his kit to the workspace in 2 ways, described at *Adding a PDK to a Workspace in ADS 2011*.

The user can use the *Remove from List* button, after selecting one or more libraries, to remove them from the list.

Note

The *Remove from List* button does not remove a PDK from the current workspace, but removes it from the Favorite PDKs list. To remove the PDK from the workspace, either uncheck it in this dialog box or refer to *Removing a PDK from a Workspace*.

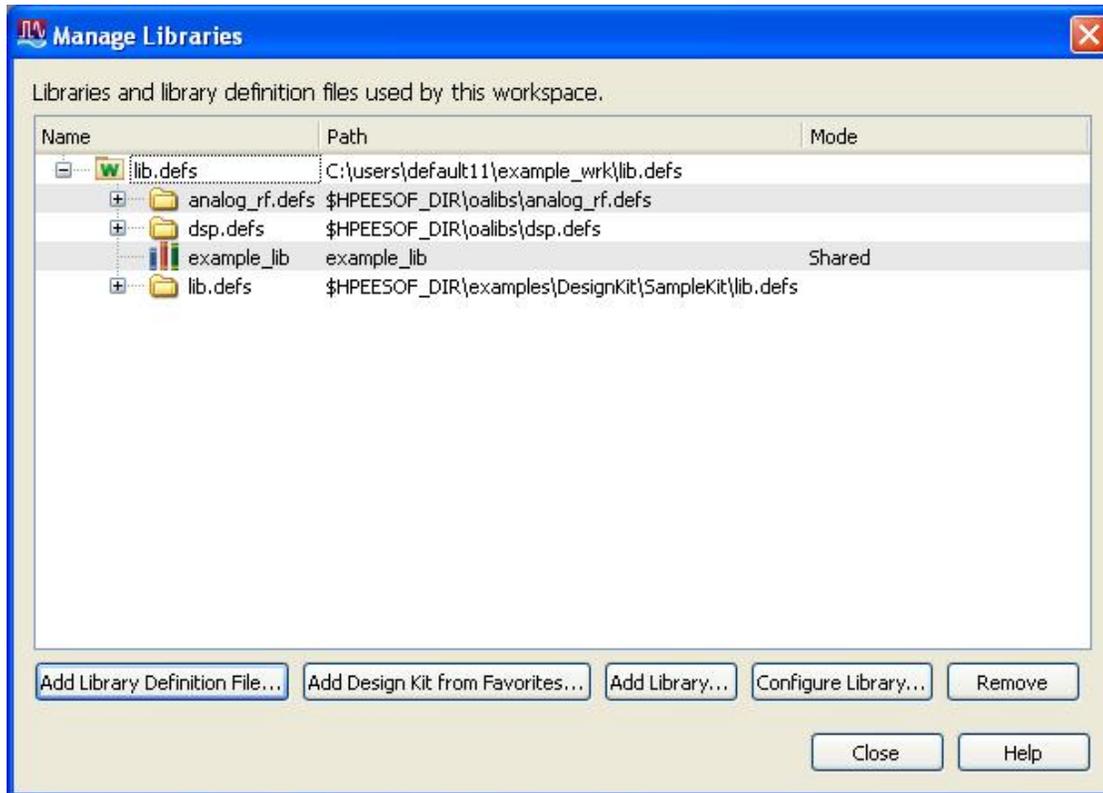


Manage Libraries

This dialog box contains information about the different libraries included in the currently open workspace. This is where you'll be able to find out information about all libraries in

your currently opened workspace.

These can also be viewed in the lib.defs file present in the workspace, but it is not recommended to edit that file manually. All editing must be done through this UI.



- *Add Library Definition File...* - Used to add a design kit by including its .defs file. On doing this, the design kit shows up in the hierarchy of the workspace. The workspace's lib.defs must be selected before using this option.
- *Add Design Kit from Favorites...* - Opens up a dialog box containing the list of favorite design kits. In this dialog that opens up, simply check the kit you would like to add to your workspace.
- *Add Library...* - Used for adding a library which has no .defs file. This is not used for Design Kits.
- *Configure Library...* - Opens a dialog box that creates the eesof_lib.cfg for the design kit.
- *Remove* - Clicking on a design kit entry in the hierarchy and then using this option removes that Design Kit from current workspace.

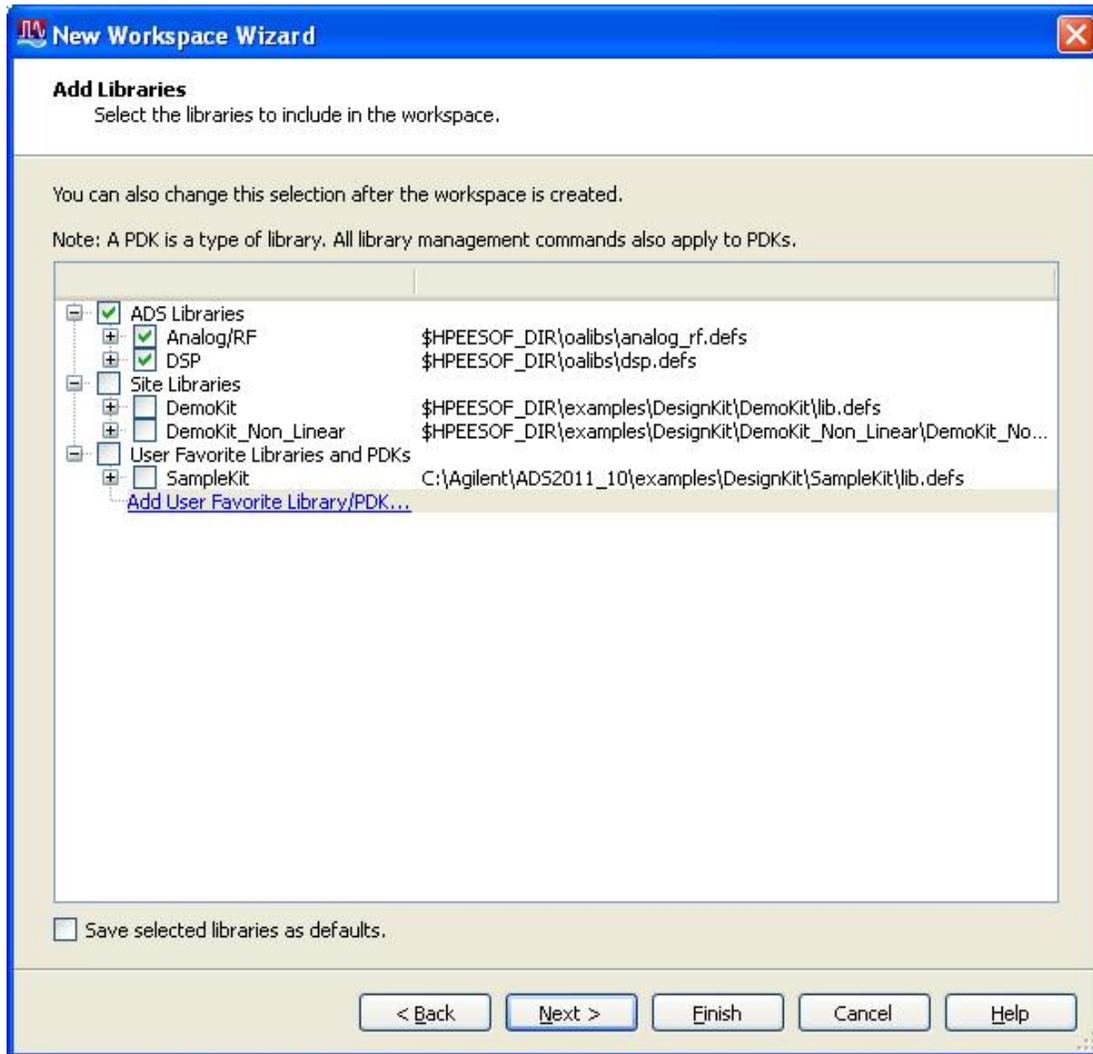
Note
If you would like to add some libraries in all workspaces you create, check the field at the bottom which says **Save selected libraries as defaults**, while creating your workspace.

Adding Design Kits at Site Level

The Site level option is used to provide design kit capability for users in a networked environment. This option enables a site librarian or CAD manager to manage a set of libraries that are accessible to all engineers without any effort from the individual engineers.

While creating a new workspace, the dialog box shows the *Site Libraries* which can be included in any workspace. To add your library to this list, you can edit the *favorite_libraries.xml* file present at \$HPEESOF_DIR/custom/config.

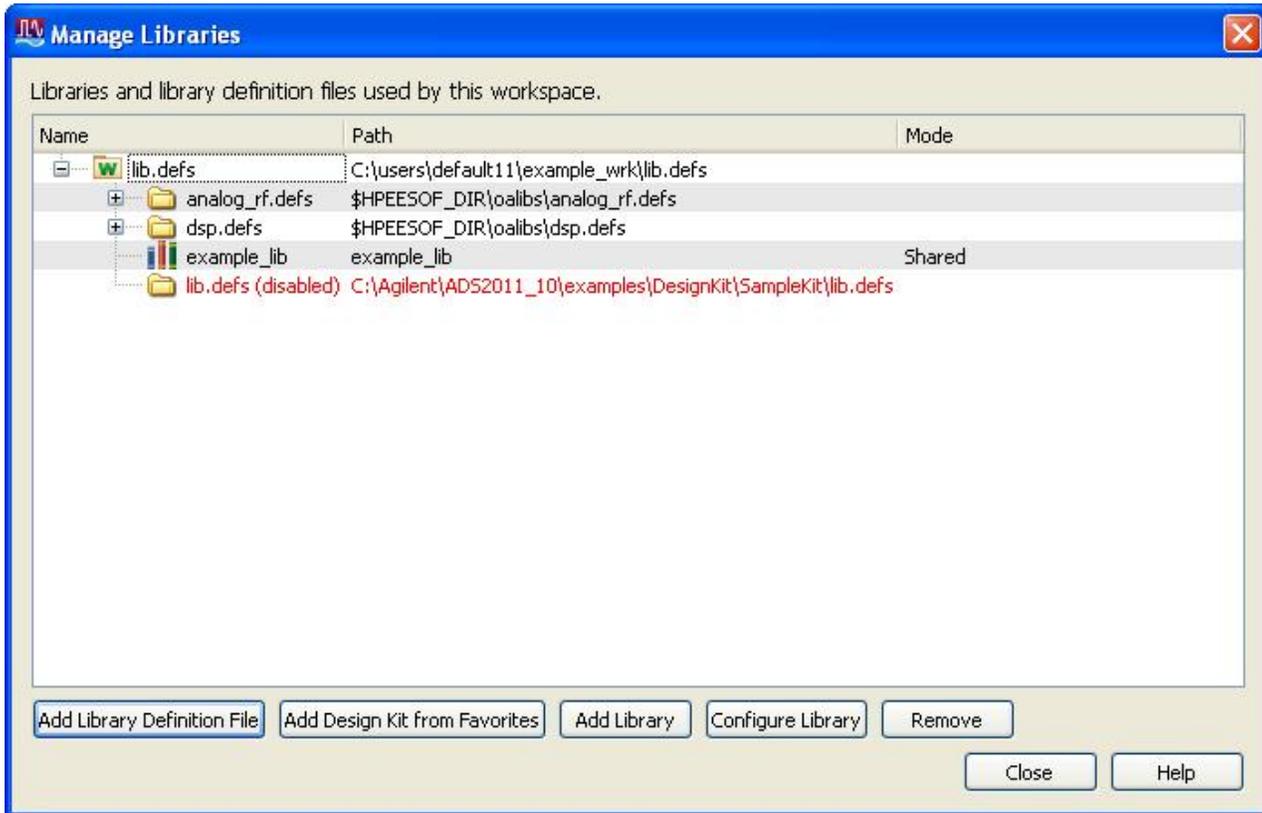
One way of doing this, without editing the xml file, is to edit your personal favorite design kits setup (using the UI) the way you want the site ones, then copy that xml file to the site favorites. Your personal favorite design kits setup is stored at `$HOME/hpeesof/config/favorite_libraries.xml`



Enabling Selected Design Kit

Design Kits that have been added to your workspace, are kits that are recognized by Advanced Design System. If a design kit is shown as disabled, it is not available for use because of any of the following reasons:

- The Design Kit isn't present at the location where it was previously, when it was added to the workspace.
- There was an error while adding the kit to the workspace.

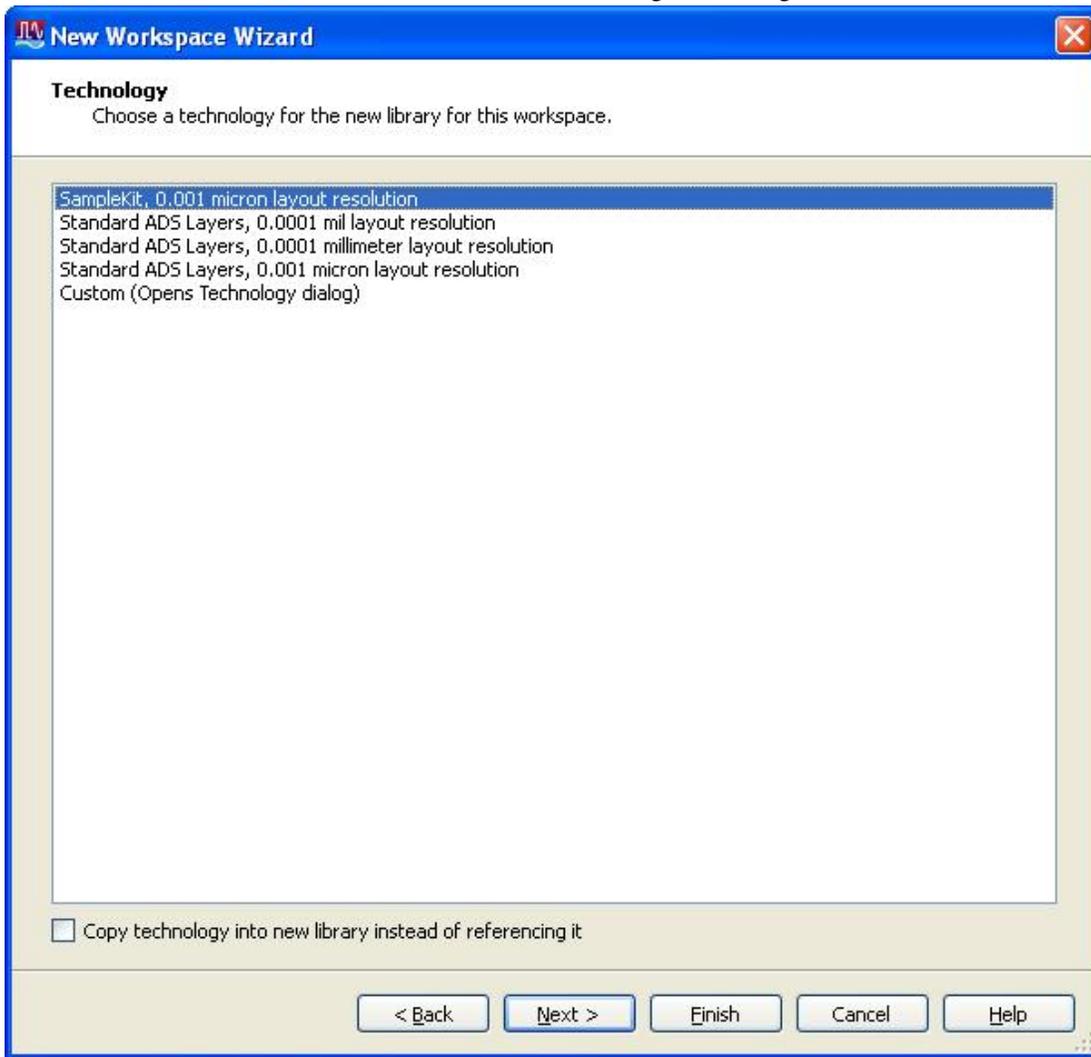


To enable a design kit that is shown as currently disabled:

1. Check whether the location of the design kit is correct.
2. Check for any error messages that are received when the kit is added to the workspace.

Setting-up Workspace to use Kit's Technology

While creating a new workspace, ADS gives you an option to add the kit's technology to your library. These may be provided in a kit in the form of tech files, preferences files, material files, layer mapping files and Momentum substrate files.



Now if you created a workspace and forgot to add the kit, you can add it using [Manage Libraries](#). But now you will have to explicitly setup the library to use your kit's technology. In your workspace, go to **Options > Technology > Technology Setup** in the ADS Main window. In the **Referenced Libraries** tab, click on **Add Referenced Library** button and select your kit's technology. Click **OK**.

For more information on the various technology files, refer to *Whats New in the Upgraded PDKs* and *Understanding the ADS Design Kit File Structure*.

If the user selects a kit, then files are copied (if present) from the design kit's library. These files are:

- The schematic and layout prf files. These files contain all workspace-level (not library-level) preferences. Some preferences in a library will override the workspace preferences. These preferences are explicitly labeled in the Options/Preferences dialog.
- All *.layerprf files. These files contain workspace-level overrides for layer color/pattern/line/etc. and can override the settings for the any library, including the built-in ads_schematic_layers library. These files do not change the colors actually stored in library.

These files must be located in the main library of the design kit. Note that this only happens during workspace creation. Adding a new library later will not copy these files,

because these are global files to the workspace.

Using an ADS Design Kit to Create a Schematic

After successfully adding an ADS design kit and learning how to use the Design Kit Menus to manage your design kits in ADS, you can use this section to help you get started designing a circuit with an added design kit.

If the design kit that you added came with directions, review these before starting to design. The design kit may contain special features not covered in this documentation that might require manual configuration. There may also be custom menus that you should be aware of.

A design kit from a foundry should also contain detailed information regarding each component in the design kit, as well as an example workspace demonstrating how the design kit may be used. This example can be opened and simulated to ensure that you have properly installed the design kit.

Components in a design kit may be present in the component palette or in the Library Browser, or both. Both are accessed from the schematic window. The component palette is always visible on the left side of the drawing area. If your selected design kit is not visible in the palette, open the Component Palette List and scroll down until you find it. A single design kit may include more than one palette. For example, passive and active devices might be listed in separate palettes. Likewise, components in the Library Browser can be presented in different sub-groups. The Library Browser can be opened by a button on the toolbar or from the **Insert > Component > Component Library** menu item.



The components can also be accessed from the *Library View* in the ADS Main window.

One special component that will be in most design kits is a *process* or *include* component. In some cases, this is used so that the simulator can find model files stored in the design kit. If this component is supplied, it is most likely required to be in your schematic for simulation to be successful. Find the *process* or *include* component on the palette or in the library and place this component in your schematic first. Place it at the top level of a hierarchical design.

Continue designing your circuit now by placing components out of the design kit or the standard palettes. Place the proper simulation components from a simulation palette, and simulate the circuit.

For a design kit to experiment with, browse to the examples directory and look for DesignKit/SampleKit. This kit also contains an example workspace in the *examples* folder. For best results, make a local copy of the workspace before attempting to simulate, since simulation requires write permission in the workspace directory, as do some design kit configuration steps. An *lib.defs* file in the workspace directory ensures that the design kit gets loaded when the workspace is opened.

For information on what to do if you have problems with a foundry-supplied design kit, refer to Design Kit Customer Support.