Building an Integrated Library

Integrated libraries combine schematic libraries with their related PCB footprints and/or SPICE and signal integrity models, all together in a non-editable form. All model information is copied into the integrated library from the model libraries or files and so all the component information is stored together, regardless of the location of the original source libraries. This makes integrated libraries truly portable.

Source libraries, including any number of schematic libraries and the related model libraries and files (PCB footprints, SPICE or signal integrity models) are added to a Library Package project file which is then compiled to generate an integrated library. To modify an integrated library, you must change the source library first and then recompile the integrated library.

Altium Designer comes with a set of source libraries and integrated libraries (*.IntLib files) stored according to the manufacturer's name in the \Library folder of the Altium Designer installation. The schematic source libraries (*.SchLib files) are included in these integrated libraries and can be extracted by opening the integrated libraries. PCB footprint models are located in the \Library\PCB folder in the form of PCB libraries (*.PcbLib files).
SPICE models used for circuit simulation (*.ckt and *.mdl files) are located within the integrated libraries in the \Library folder and signal integrity models are located in the \Library\SignalIntegrity folder.

Using Altium Designer integrated libraries

Using an integrated library is very similar to using schematic libraries to place components and add model names. The only difference is that all the information about the component and its related models has already been added to the schematic symbol for you. You can check the Models list of the Component Properties dialog of a component to see what model names have been included with the
schematic symbol. Model names can be changed or added from PCB or other model libraries once you have placed a component in a schematic sheet.

When the schematic is transferred from the Schematic Editor to a blank PCB using the **Design » Update PCB** command, the Source Reference Links fields of the Component dialog for each PCB footprint are populated with source library pathnames so you can easily trace where the components and models originated from if you need to change them.

Note that you can still use schematic or PCB libraries (without being in an integrated library) by adding them to the Library list as usual.

## Adding and removing libraries

All libraries must be added to the Library list in the Libraries panel for the component symbols to become available for placement in a schematic and footprints for the components to be available when creating the PCB.

To add integrated libraries to the Libraries list:

1. Click on the Libraries tab or select **View » Workspace Panels » System » Libraries**. The Libraries panel displays.
2. Click on the Libraries button at the top of the panel to open the Available Libraries dialog.
3. Click on the Installed tab and click Install to add libraries.
4. Browse to the library you require in the Open dialog and click Open. The library appears in the Installed Libraries list.
5. Click Close and the integrated library is added to the Libraries list in the Libraries panel. The library name appears in Libraries panel and is now the active library.

6. If a schematic document is open, you can select the component you wish to place from the Components list of the Libraries panel. Click Place <component name> to place it.

   To remove a library from the Library list:
   1. Click on the Libraries ... button at the top of the Libraries panel to open the Available Libraries dialog. Click on the Installed tab.
   2. Select the library you want to remove. Hold down the Shift or Ctrl key to multiple select libraries. Click on Remove.
   3. The library pathname disappears from the Installed Libraries list. Click Close. The library is no longer available in the Library panel. Simply add it back in when required.

**Finding a component in integrated libraries**

If you do not know where the component you wish to use is located, use the Libraries Search facility.
1. Click on the Libraries panel tab and the Libraries panel displays.
2. Click on the Search button at the top of the Libraries panel to open the Libraries Search dialog.
3. In the search text field at the top of the Libraries Search dialog, type in the name of the component you wish to search for. The * symbol is a wildcard used to take into account the different prefixes and suffixes used by different manufacturers, e.g.* 396* will find all components with this string in its name. The system will interpret your search text as a query which is visible the next time you enter this dialog, e.g.* 396* becomes (Name like '396') or (Description like '396'). Click the Helper button for more information about writing queries or refer to the Query Language reference.

4. Select a Search type from the Search Type drop-down list, e.g. Components, to find all the component libraries that match your query.

5. Select a Scope for searching in installed libraries or libraries on the search path you nominate by clicking on the folder icon in the Path field. Make sure Include Subdirectories is selected if you are searching through the libraries that reside in directories below the nominated pathname.

6. Click the Search button to begin the search. The Query Results are displayed in the Libraries panel as the search takes place.

7. Click on the component you require in the Components list of the Libraries panel to select it and to display its model names and graphical representations.

8. Click on the Place <component name> button to place the component. Alternatively, just double-click on the component name in the Components list. If you choose a component that resides in a library that is not currently installed, you will be asked to confirm the installation of that library before you can place the component on your schematic. Click on Yes to install the library and the component appears 'floating' on the cursor.

9. Press TAB to display the Components Properties dialog while placing the symbol to set the designator.
10. Check the Models list to check that all the required model information, e.g. a footprint model, is already added from the integrated library.
11. Click OK and then click to place the component symbol on the schematic sheet. Right-click or press ESC to end component placement mode.

Creating integrated libraries

There are three ways to create an integrated library:
1. by adding existing schematic and PCB or model libraries to a Library Package, or
2. from open schematic or PCB documents using the Make Integrated Library command.
3. from an existing Database Library or SVN Database Library, using the Offline Integrated Library Maker Wizard.
Each process is detailed in the following sections.

Creating an integrated library using a Library Package

A Library Package is created first with at least all the schematic libraries added and pathnames can be set to the models libraries. Using the Project commands, the Library Package is then compiled to create the integrated library. Any errors generated during the compiling of the integrated library are displayed in the Messages panel for analysis.

Creating the source Library Package

The source of an integrated library is an integrated Library Package. First, we will create a new Library Package, then add schematic libraries to it and then compile it into an integrated library.
1. Select File » New » Project » Integrated Library. Alternatively, click on Blank Project (Library Package) in the New section of the Files panel.
2. The Projects panel displays with an empty Library Package file named Integrated_Library1.LibPkg. There are no source libraries (schematic or PCB libraries) added to the Library Package at this stage.
3. Rename the new Library Package using the File » Save Project As command and save it (with a
*.LibPkg extension) to your chosen location. The pathname to the Library Package file is added to the Output Path field in the Options tab of the Options for Integrated Library dialog (Project » Project Options). When the integrated Library Package is compiled, the resulting integrated library file (*.IntLib) will be saved to an output folder named Project Outputs for Integrated_Libraryname which is generated in the same folder as the Library Package file.

Creating a schematic library

Before you can add any schematic libraries to the Library Package, you need to create some! You can create a schematic library out of the components that have been already placed on schematic documents in a project using the Design » Create Schematic Library command which is available in the Schematic Editor.

If a schematic document is not part of a project, you can still create a schematic library from it when it is open. The only difference is that the generated schematic library will not be added to a project and will display as a free document in the Projects panel when created.

Alternatively, you can create a schematic library from scratch using the File » New » Library » Schematic Library command. Then create your own components using the Schematic Library Editor, or copy in components from other open schematic libraries using the Tools » Copy Component command. See Decompiling an integrated library later in this tutorial for more information about extracting a schematic library from an existing integrated library.

For more information about creating components and footprints, refer to the Creating Library Components Tutorial tutorial.

Making a schematic project library

To create a schematic library from components in all schematic documents in a project:

1. Open the documents in the project by right-clicking on the project filename in the Projects panel and selecting Open Project Documents.
2. With the schematic documents that contains all the components you want to add to the new schematic library already active, select Design » Make Project Library in the Schematic Editor. Click OK to confirm.
3. The new schematic library will open in the Schematic Library Editor when it is created. All the components in the open schematic files are copied to the new schematic library, named Project_name.SCHLIB, stored in the same folder as the project file (Project_name.PRJPCB). The filename will appear in the Projects panel in the Libraries\Schematic Library Documents folder.
4. Save or rename the new schematic library using File » Save As and close it.

Creating a PCB library

PCB libraries are supplied with Altium Designer and are stored in the default location of \Library\PCB folder of the Altium Designer installation. However, you can create your own PCB library of footprints from an open PCB file, in a similar manner to creating a schematic library.

1. With the PCB document that contains all the footprints you want to add to the new PCB library already active, select Design » Make PCB Library.
2. The new PCB library will open in the PCB Library Editor when it is created. All the footprints in the open PCB document will be copied to the new PCB library named PCBfilename.PcbLib, which is stored in the same folder as the source PCB document. The filename will appear in the Projects panel as a free document.
3. Rename the new PCB library using File » Save As and close it.

Adding source libraries to the Library Package

1. Add in the source libraries to the Library Package by selecting Project » Add Existing to Project or right-click on the selected .LibPkg file and select Add Existing to Project. The Choose Documents to Add to Project [Integrated_Libraryname.LibPkg] dialog displays.

2. Browse to find the schematic libraries (*.schlib) that you want to add to your Library Package. The schematic components store all the information needed to find related models in their Component Properties dialogs, so these are the most essential elements to be included in an integrated library.
3. Click Open and the added libraries are listed as Source Documents in the Projects panel.

Adding models to the Library Package

Now that you have schematic symbols in the library package, the next step is to link the required models to each symbol. This could include a PCB footprint, a simulation model, a signal integrity model, and a 3D model.
Altium Designer has a standard system for making models available, regardless of whether you are building an integrated library package, or working on a schematic design. There are three ways of making models available in Altium Designer:

- installing the library/model in the Installed Library list
- adding the library/model to the project
- defining a search path to the model.

There are advantages to each, so choose the method that best suits your work practices. Different models work better with different approaches too, for example, you might not want to see a large number of simulation models listed in the Projects panel when you open an integrated Library Package, but might like to see the PCB footprint libraries. In this case, you would define a search path to the folder where the simulation models are stored, and add the PCB footprint library to the integrated Library Package.
Installing the library/model in the Installed library list

Library or model files added to the Installed Libraries list in the Installed tab of the Libraries panel will be available for all projects and remain in the list until removed.

The following types of library files are supported:

- Integrated Libraries (*.IntLib)
- Schematic Libraries (*.SchLib)
- Database Libraries (*.DBLib)
- SVN Database Libraries (*.SVNDBLib)
- Footprint Libraries (*.PcbLib)
- Sim Model Files (*.Mdl)
- Sim Subcircuit Files (*.Ckt)
- PCB3D Model Libraries (*.PCB3DLib). (Legacy library type, not used for Altium Designer 10/12, Altium Designer 2013)

See the section [Adding and removing libraries](#) for more information about installing libraries.

Adding models as source libraries to the Library Package

Add model libraries, e.g. PCB libraries, to the Library Package in the same way as the schematic libraries are added.
1. Select **Project » Add Existing to Project**, or right-click on the selected *.LibPkg file and select Add Existing to Project.
2. Browse to find the model libraries that you want to add to your Library Package.
3. Click Open and the added libraries are listed as Source Documents in the Projects panel.

Setting the pathname to model libraries and files

Alternatively, if the PCB footprints libraries, SPICE models or signal integrity models are not added to the Library Package, the schematic symbols in the integrated library will refer to them using the pathname set up in the Options for Integrated Library dialog and stored in the Library Package project file (*.LibPkg).
1. Set up the pathname to the PCB libraries you want used by the schematic symbols in the integrated library by selecting **Project » Project Options**, or right-click on the Library Package filename in the Projects panel and select Project Options. Click on the Search Paths tab of the Options for Integrated Library dialog.

![Options for Integrated Library](image.png)

2. Add in the pathnames to the location of the footprints and models required by clicking on Add in
the Ordered List of Search Paths section of the Search Paths tab.

3. Browse to the folders required in the Edit Search Path dialog by clicking on the ... button and locating the required model libraries and clicking OK. In the example below, we have added in the pathname to the folder C:\MySimModels where some SIM models (*.mdl) and sub-circuits (*.ckt) have been saved.

4. Click Refresh List to view the files found on the search path and then click OK to close the dialog.

5. Click on Refresh List in the Search Paths tab in the Options for Integrated Library dialog to confirm that the models are located correctly.

6. While you have the Options for Integrated Library dialog open, click on the Error Reporting tab to see what type of errors and warnings could be generated when the integrated library is compiled.

7. You can change the severity of the violation by clicking on the Report Mode next to the required violation type and selecting another mode from the dropdown list. Click OK to save the project options and close the dialog.

**Compiling the integrated library**

Once you have added the libraries and set any pathnames required, compile them to create the integrated library.

1. Select **Project » Compile Integrated Library** or right-click on the selected Library Package (.LibPkg) file and select Compile Integrated Library.
2. The source libraries and model files are compiled into an integrated library. The compiler checks for any violations, such as missing models or duplicate pins, that have been set in the Error Checking tab of the Options for Integrated Library dialog (Project » Project Options). Any errors or warnings found during compilation are displayed in the Messages panel. Click on the System button at the bottom of the Altium Designer window and select Messages to view errors or warnings, or choose View » Workspace Panels » System » Messages.

3. Fix any inconsistencies in the individual source libraries at this point and recompile the integrated library. See Modifying an integrated library for more information.

4. A new Integrated_Libraryname.IntLib is generated, saved in the output folder nominated in the Options tab of the Options for Integrated Library dialog. The integrated library is automatically added to the current Libraries list in the Libraries panel, ready to use.

Creating an integrated library from schematics or PCBs

You can also create an Integrated Library from all the schematics in a project by selecting the Design » Create Integrated Library command in the Schematic Editor. An Integrated Library (named Project_name.IntLib) will be generated (compiled), added to the Libraries\Compiled Libraries folder in the Projects panel and installed in the Libraries panel.

You can also access the Design » Create Integrated Library command from the PCB Editor.

Creating an Integrated Library from a Database Library

Altium Designer provides the facility to compile an integrated library directly from a database library - either a non-version-controlled Database Library (DBLib), or a version-controlled SVN Database Library (SVNDBLib). In this way, your CAD Librarians can still use database/version-controlled libraries, while your designers use regularly regenerated integrated libraries, working in an 'offline' fashion as it were.

Conversion is performed using the Offline Integrated Library Maker Wizard. This Wizard is accessed from either the active DBLib or SVNDBLib document using the Tools » Offline Integrated Library Maker command.

The process of conversion to an integrated library is carried out on a per-database-table basis. You have full control over which tables in the database - linked to your database library - are considered in this process. A separate integrated library will be generated for each included table.

For more information, refer to the Database Library Migration Tools document.

For more information on database libraries, refer to the Using Components Directly from Your Company Database and Working with Version-Controlled Database Libraries documents.

Modifying an integrated library

The integrated libraries are used to place components and cannot be edited directly. To make changes to an integrated library, make modifications in the source libraries first and then recompile the integrated library to include the changes. To modify an integrated library:

1. Open the required integrated library's Library Package file (*.LIBPKG). Select File » Open and browse to the Library Package file, e.g. Integrated_Library1.LibPkg, in the Choose Document to Open
dialog and click Open.
2. Open the source library file you want to change. e.g. libraryname.schlib, by double-clicking on the library name in the Source Documents list in the Projects panel. The library opens in the Schematic Library Editor.

If you wish to modify a footprint, you would have to add in the required PCB library before you could edit the models. To do this, you could right-click on the .LIBPKG filename in the Projects panel and select Add Existing to Project, or alternatively, click on the Libraries button in the Libraries panel, select the required library in the Project tab and click on Add Library. You could also use File » Open to open a model file directly.

For more information about creating components and footprints, refer to the Creating Library Components Tutorial tutorial.

3. Make changes as required, save the modified libraries and close them.
4. Recompile the integrated library by selecting Project » Compile Integrated Library (or right-click on the .LIBPKG filename in the Projects panel and choose Compile Integrated Library). The integrated library is recompiled and any errors are listed in the Messages panel. The modified integrated library is added to the Libraries panel and is ready to use.

Decompiling an integrated library

Although integrated libraries cannot be edited directly, they can be decompiled back into their constituent source symbol and model libraries. To do this:
1. Open the integrated library (*.IntLib) that contains the source library you need to modify. Select File » Open, browse to the integrated library in the Choose Document to Open dialog and click Open.
2. Confirm that you do wish to open the integrated library to extract the source libraries and not just install the library. Click on Extract Sources. The source schematic and model libraries are generated and saved in a new folder named Integrated_libraryname, which is created in the folder storing the integrated library. A Library Package (integrated_libraryname.LibPkg) is also created and the source schematic libraries are extracted and listed in the Projects panel. PCB libraries (*.PcbLib) are generated as well and stored in the new Library Package folder but are not automatically added to the Projects panel. The pathname in the Search Paths tab of the Options for Integrated Library dialog (Project » Project Options) indicates where the schematic components will search for when the footprints and model files are required.
3. Make necessary changes to the source libraries and save them by selecting File » Save and then close them.
4. Select the Library Package file (*.LIBPKG) in the Projects panel and select Project » Compile Integrated Library. The integrated library is recompiled and any errors are listed in the Messages panel. The modified integrated library is added to the Libraries panel and is ready to use.
5. Close the Library Package and save it to the same folder as the source libraries.

Source URL: https://techdocs.altium.com/display/ADOH/Building+an+Integrated+Library#comment-0