

## Chapter 2

# Files and File Types

Chapter 1, “Getting to Know Autodesk Navisworks,” introduced you to the basics of the Autodesk Navisworks interface. In this chapter, we’ll cover the principles of the various file types and the process of aggregating these disparate files together to create a single whole-project view of your model. By bringing together geometry and data from multidisciplinary teams, you can explore and review complex models in real time.

One of the most important things you can do to become proficient at Navisworks is get a firm grasp on file types and the process of how they are aggregated. File aggregation is one of the core strengths of Navisworks and one that is the foundation for all the features you’ll discover in the following chapters. After all, this is how you bring your project together. Spend some time with these concepts and you’ll be far more successful!

In this chapter, you’ll learn to:

- ◆ Understand Navisworks file formats
- ◆ Open and append various files
- ◆ Configure object enablers

## Navisworks File Types

The power of Navisworks rests in its ability to open files originated from a variety of design and engineering applications and its capacity to then share and coordinate these different file types into a single data-rich intelligent model. The composite model of aggregated files can then be selectively available or viewed by all parties involved to enhance the design review and coordination process. In addition, Navisworks converts and compresses most files up to 80 percent of their original size, so sharing and collaborating is greatly improved. This section will cover the numerous file types and explain the differences. We will also explore some of the standard workflows and provide best practices for file sharing and aggregation.

### Native File Formats

Navisworks utilizes three native file formats: NWD, NWC, and NWF. This section will explain the differences and explore some of the various workflows.

#### NWD FILE FORMAT

An NWD, or Navisworks Document file, is the basic file format that contains all geometry, relevant object properties, and clash tests, as well as any markup, comments, and viewpoint information. As the project evolves, an NWD can be thought of as a snapshot of the model that

captures the current conditions or milestone events. This also includes clash tests and 4D simulations, which will be covered in subsequent chapters. The file size of most NWDs is considerably smaller compared to the corresponding CAD format.

### NWC FILE FORMAT

NWC, or Navisworks Cache files, are generated when CAD files or laser scans are opened, merged, or appended in Navisworks. They can also be created by using a designated file exporter, which we'll cover later in the section "File Exporters." NWC files are read-only files and can be thought of as a transfer mechanism to convert CAD, Autodesk Revit, and other model data into a format that Navisworks recognizes. All geometry, relevant object property information, and display settings from the original source files will carry over with the NWC export. Once the file is opened in Navisworks, any changes made—such as redlines, markups, viewpoints, or display overrides—cannot be saved back to this format.

When the native CAD format file is first brought in, Navisworks creates a file with the same name but with the .nwc file extension in the same directory as the original source file. This is an important concept of a successful Navisworks project, so keep in mind that good model management skills make this process easier.

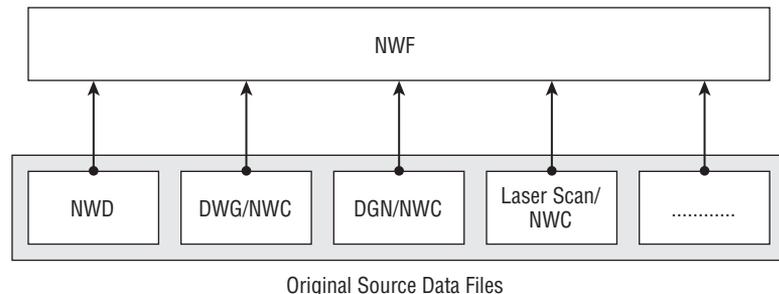
When NWC files are opened, merged, or appended, Navisworks compares the original data to the newly created NWC file and re-caches the file if data in the original file is newer than the NWC. This ensures that as changes are made to the project design, they are reflected in your Navisworks project. If no changes are detected, Navisworks opens from the original NWC file, resulting in quicker loading. As a best practice, consider standardizing on using the Append command instead of Open. Doing so reinforces this concept of file aggregation, which is an important part of the overall project coordination process.

### NWF FILE FORMAT

NWF files host no 3D geometry but rather contain links to the geometry from the original native source files (see Figure 2.1). Besides the links, NWF files contain such items as markup data, viewpoints, comments, graphical overrides, search/selection sets, TimeLiner, and Clash Detective data. We'll explore these topics in more detail in future chapters.

When working with the NWF file format, you'll notice the file size for NWFs is extremely small as compared to the NWC/NWD formats; however, remember the user must have access to the original source files to view properly. As you work toward mastery of Navisworks, consider using the NWF as the standard file format during your project. While NWD files can be thought of as static snapshots that capture specific milestones, using the NWF workflow is dynamic and allows for easy updating of design changes from the original source files. Later in the book, you'll explore clash detection, 4D simulation, and other concepts, so having a good grasp of the file formats is crucial.

**FIGURE 2.1**  
Source files linked  
to the NWF file  
format



## Using NWF and NWD Formats in a Typical Workflow

Typical Navisworks workflows utilize a combination of NWD, NWC, and NWF files. As a best practice, it's recommended that during an ongoing project the NWF file format be utilized so that the original source files can be updated and re-cached. Remember, the NWF format is strictly a container that links out to the different source files. Graphical overrides such as changing model element colors and transparency are captured and stored in the NWF file. As a result, when updated cache files are loaded, Navisworks will remember your graphical settings and apply them to the updated files. This principle is similar to the concept of external references (Xrefs) in AutoCAD whereas changes made to the original source files will update the NWF file.

Similar to the NWC format, the NWD format includes all geometry and object property data but can save changes and graphical overrides to the model. The primary difference is that NWD files do not update or re-cache if changes have been made to the original source data. Sometimes having a static representation of your model is useful if you need to archive specific milestone events. Also, since this format has all of the geometry "baked" into the file, it is a perfect format to share with other users without worrying about supplying the accompanying source files.

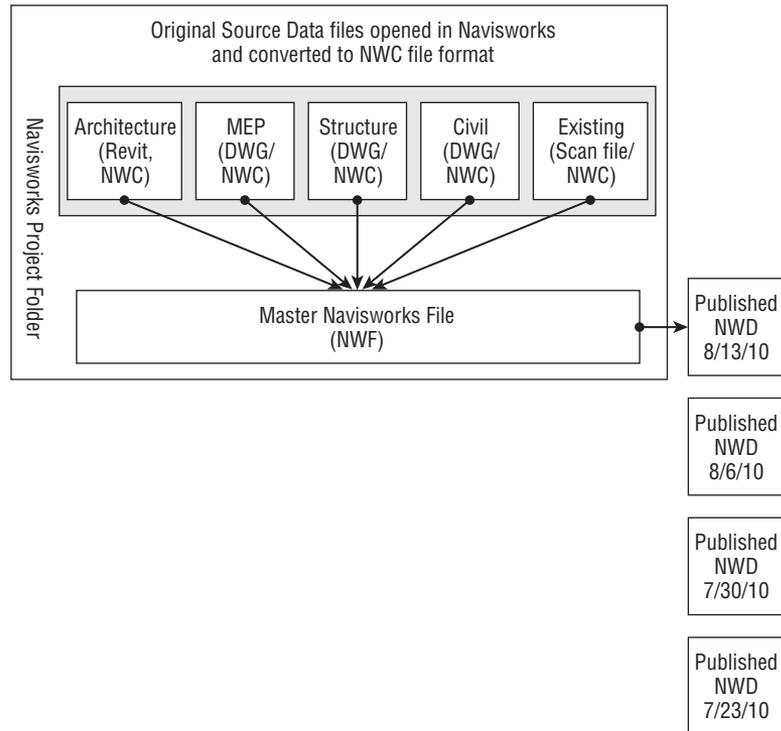
Now that we've covered the basic file formats, let's look at a typical workflow. The project coordinator opens Navisworks and appends the original source 3D data files from the specific trades on the project (e.g., Architecture, MEP, Structure, Civil, or Existing Conditions). Navisworks converts these files to the NWC format and places the NWC files in the same directory as the original source files. Note that certain files types such as Revit (RVT) cannot be appended directly in Navisworks but must be converted to an NWC file first. This concept will be covered in the section "File Exporters" later in this chapter.

When the project coordinator saves the Navisworks session, the project is saved as an NWF format, which captures the link to the saved source and NWC files. In the meantime, the architect, MEP coordinator, structural engineer, and civil engineer all make changes, such as moving objects or adding/removing components, to their original 3D data files. When the project coordinator opens the project saved as an NWF, Navisworks will look for the linked files and do a quick comparison to determine if any of the original 3D data files are newer than the NWC files. In our sample workflow, all of these original data sources were modified, so Navisworks re-caches those files and overwrites the original NWC files with the new data. Periodically the project coordinator will save or publish the model to the NWD file format to archive specific milestone events or share with external users who do not have access to the original source data files (see Figure 2.2).

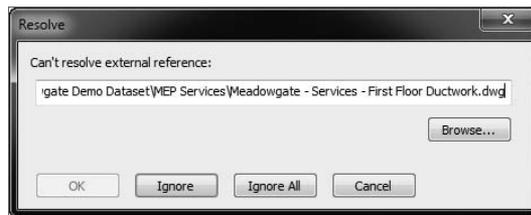
In the event the original source files are renamed or moved, Navisworks prompts you for their location, as shown in Figure 2.3. If the accompanying NWC files are moved or deleted, Navisworks automatically re-caches the files and creates a new NWC file.

To manually locate the original data source files, click the Browse button and navigate to the new location. When the NWF file is resaved, it will remember the new location for these files. Also, it should be noted that Navisworks uses a relative path structure when saving files. If your project folder contains several subfolders for the various disciplines (Architect, MEP Engineer, Structural Engineer, etc.), you can share this project folder without breaking any of the links.

**FIGURE 2.2**  
Typical project workflow



**FIGURE 2.3**  
The Resolve dialog box



## File Readers

File readers allow Navisworks to open and append additional file types from a variety of design and engineering applications. When you open a 3D model in Navisworks, the appropriate file reader is loaded automatically and all model geometry and associated metadata is incorporated into your scene.

## NAVISWORKS SUPPORTED FORMATS

In addition to the native file formats (NWD, NWC, and NWF), Navisworks can read over 40 different 3D CAD formats, as shown in Table 2.1. Model entities contained in both 2D and 3D geometry and all associated object property data is typically supported. Being able to work with such a wide range of file formats allows Navisworks to accommodate almost every design and engineering application. Having this level of file compatibility in turn allows you to collaborate, coordinate, and communicate effectively. For a complete list of supported formats and applications, see Appendix B.