

Data Management for Autodesk® Revit®

Autodesk® Revit®’s functionality is extremely powerful, and being built on database technology, it offers significant gains in design and draughting. Revit® is very reliant upon libraries and templates. With every new release of Revit®, a new content library is available for installation. This causes challenges for users, BIM Managers and CAD Managers. Managing custom, default and downloaded content, as well as hard drive space and templates, can be a tedious and time-consuming task, to say the least.

This document is intended for people responsible for dealing with these issues. This document discusses the various pain points and challenges faced when deploying Autodesk® Revit® in a company. Also introducing readers to new concepts for data management.

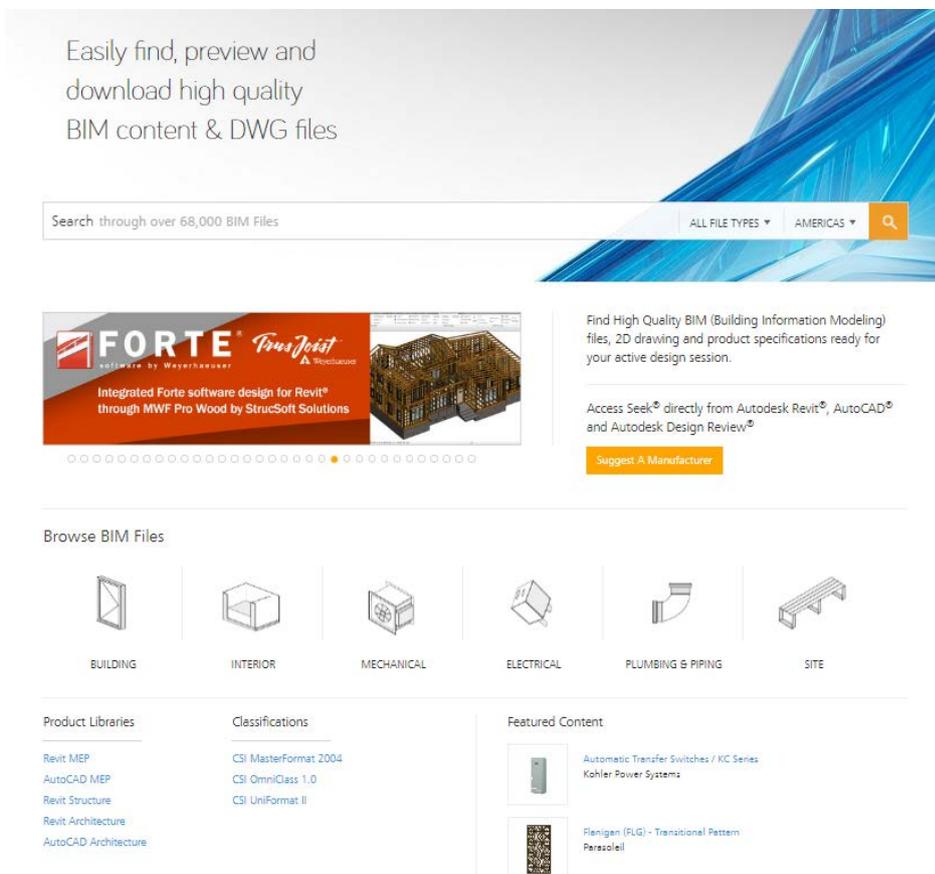


Figure 1: Autodesk® Seek, is a great site to download BIM content for Revit®.

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Business challenges

Autodesk® Revit® is a 3D CAD application that leverages Building Information Modelling (BIM) that is built on relational database architecture, to keep consistency between elements and views. The concept of BIM and relational databases are a unique combination that allows designers and draughtsmen to better manage designs and changes with less effort and fewer mistakes.

While the idea behind BIM and relational database schemas are an impressive and powerful combination, it is not without its own set of issues. One of the primary issues or requirements, depending on how you look at it, are Families or content libraries and templates.

**The management of parameters, or geometry from within family components, will not be explained, but the actual storage and management of files stored on an HDD {Hard Disk Drive} will be addressed.*

Consider the following scenario:

“You are a CAD manager, who manages 20+ users of Autodesk® Revit®. You receive the latest release of Revit® and are planning the installation and migration of projects, templates, and content libraries to the new release. It is also noted that the majority of users have 120GB SSD drives for their primary HDD, and a second HDD for data storage which is a mixture of 1TB, 750GB, and 500GB HDD’s.”

In this example. We should consider the following issues:

- Backwards Compatibility & Duplicate Content
- SSD Storage Limitations
- Accessibility & Custom Content
- Templates
- Bandwidth
- Backup

While these issues may seem trivial to some, these are a real and ever-present issues in more companies that you might think, with special attention being drawn to bandwidth and backup.

Backward Compatibility & Duplicate Content

Backwards compatibility is a real challenge when working with Revit® and should always be considered when installing a new release. Files opened in a new version will automatically be upgraded to the newer version, however, if the file is not saved, it will not be saved as the latest version. This means that the next time the file is opened, the file will be upgraded again. It is only when the file is saved, that the project or family is permanently saved as the newly upgraded version thus, no longer able to be opened in a previous release.

This behaviour is the same for both projects and families. What this means is that any newly created families need to be created in the earliest, available release of Revit® that is currently being used in the company.

Because backwards compatibility is such a challenge, it is not uncommon for companies to keep multiple libraries for different releases of Revit®, even when they know there are duplicates in the library. Some companies only keep the earliest content libraries version and install only new content that is not in the original library. They accomplish this by using a “copy paste but don’t replace existing” feature. These techniques have used both been used on default and custom content, with varying results.

The preferable option of the two would be the later, where only new content is added to the library. First duplicate the existing library, copy / install the new library on top of the duplicate library, then search all files in the duplicate library and use the “Date Created” property to determine which files are the oldest. Then, delete those files from the duplicate library. You will be left with a folder structure and some files in the library of the latest version.

Q: “But what about the previous family files. What happens when I load them into a later version but the family is an older format?”

This is a common concern. It is important to note that when a family is loaded into a project, the family is physically embedded into the project. This means that there is no link to the family file and if the family file is deleted, it will not affect the project. What happens, in this case, is the family is copied into memory, then loaded and upgraded with no save or modification being made to the original family that was imported.

Solid State Hard Drives (SSD)

Solid state Hard Disk Drives (HDD) are extremely fast and desirable for any user. But they come at a great price. The R/GB¹ of an SSD is currently sitting at about R4/GB while the R/GB of a mechanical HDD is sitting at about 78c/GB. SSD’s have indeed come down in price over the past few years, however, so has mechanical HDD’s and in many companies, it is just not feasible to spend large amounts of money on storage because it is seen as a luxury and not a necessity. This is the reason why most companies will spec a small SSD for their primary HDD to get the best performance for operating system access. Then a second mechanical HDD is used as the storage drive due to the lower R/GB costs.

Installation of Revit® and its sibling applications that may be included as part of a collection or even add-ons can consume extremely large amounts of storage space. The full Architecture, Engineering and Construction Industry Collection, requiring in excess of 70GB for all the products. Remember, if any previous version is installed, then that install, also needs to be taken into account, along with the currently installed content.

When installing any individual product or industry collection, it is possible to install to another location that is not in Program Files. There are, however, always files that need to be stored on the primary HDD. These files are spread across multiple folders that include but are not limited to:

C:\Programdata\
 C:\Programdata\Autodesk®\
 C:\Users\%userprofile%\AppData\Roaming\
 C:\Users\%userprofile%\AppData\Local\
 C:\Program Files\Autodesk®\
 C:\Program Files x64\Autodesk®\
 C:\Program Files\common files\
 C:\Program Files x64\common files\

It is possible to move some of these locations. They would need to be moved in the operating system. It is possible to move the user directory to another HDD completely or smaller subsets of

¹ Cost based on South African Rand

folders, like documents and the TEMP Folder, or even move the Program Data directory. For more information on the above challenge, please see the following link:

<https://support.microsoft.com/en-za/kb/949977>

A common practice that is used, is to install or move the content onto a network drive that can be accessed anywhere on the network. While this is a practical solution, it does cause issues when considering portable computers such as laptops. When you are on the road, on-site, or not in the office, you will not have access to the content unless there is a VPN connection to access the network. But this requires data charges, and it is not always guaranteed that the connection will be stable. It is there for advisable to keep a copy of the content locally, on a second HDD that will be accessible at all times.

Accessibility & Custom Content

Accessing content can be as complex as you make it. The challenge is, how do you make content available to users that are easy for them to find and in a logical hierarchy that makes searching for items as easy as possible. There are many variations of locations and storage practices, ranging from just a simple single folder to the most complex folder structures. Unfortunately, the structured folder usually only make sense to the creator.

When Revit® is installed for the first time, you will invariably install the content library. The default library is already laid out in a logical and well-organised folder structure. It is recommended to use this folder structure as the basis, for any new libraries that are going to be built. The best way to achieve this is to copy the default library, search for all files and delete just the files. This will leave you with a default Folder structure with no content files. New content can be added to the respective folders in the library.

This will leave you with two folder structures, one for the default library that might contain files from multiple versions, another with just custom content. While the idea of merged libraries for multiple versions does not sound like the greatest idea, consider the following: if the default library is made up primarily of content from the earliest version of Revit® that is being used in the company, any new versions of Revit® would be able to use the content. Any newer content that exists in the library would have never been available in the older libraries, thus it would only be accessible in the newer versions. The final point on merged libraries: how does one determine which version a family were used? This is the only downfall of this solution. You will only know if a user attempts to load a family. If the family is not usable in that version, they will not able to use it, thus they should move on to the next family that might work. Since the family never replaced an earlier family, that file would have only ever been available in its native version of Revit®.

Another option that extends on this functionality, is to create version subfolders in the primary default library location. Keep all common families between all versions in the lowest version sub-folder. With version specific content in their respective locations.

In some situations, a third content folder can be created to save non-company compliance families. These families may not comply with the company standards, and therefore should not be placed in the custom library locations. This may be a single folder with no hierarchy, with just a list of families, perhaps downloaded from the internet for specific uses in specific projects.

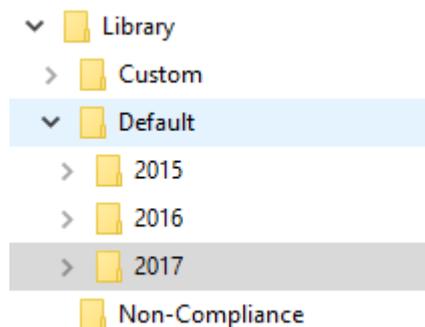


Figure 2: An example of a top level directory of a content library.

A final note on accessibility; as mentioned in the previous section, if your intention is to create an offline copy, then special care should be taken to not allow users to copy files back to the network (if the files are modified on a local machine, you don't want those files to be copied back to the library, as they may be incorrectly modified for the specific project they were working on when they were offline). This can be achieved through sync applications, such as:

- Free File Sync, <http://www.freefilesync.org>

Templates

Templates are quite often overlooked when considering content management. A Project Template in a company becomes its very life blood, without it, it can cripple the company losing any competitive edge they may have had.

Project Templates are also not backwards compatible in the same way a project is not backwards compatible. In fact, family templates are also not backwards compatible. It is, therefore, important to also keep version specific template copies depending on which Revit® versions are being used. Unlike families, it is advisable to have multiple copies of these templates for each version as upgrading a template is a time-consuming process and can consume a lot of resources.

Templates are usually stored on a network location so that all users are able to use the same data and therefore all the projects will have the same output and starting point. Issues can occur when considering portable devices such as Laptops. This can be addressed with the same methodology as before with sync folders and keeping a local copy.

Bandwidth

Bandwidth is a very serious concern to take into deliberation with newer installations. Currently, there are two ways to install the Autodesk® applications.

- Web Installer
- Local Installer

The web installer downloads everything from Autodesk® servers and installs as it is being downloaded. It uses the C:\Autodesk folder for the download location unless otherwise specified. All files that are downloaded to be installed, are downloaded into this folder first and then installed. A challenge with this method is, that the install files are not completely transferable between PCs. On all subsequent computers, the web installer will need to download the installation prerequisite files again. If the

content folder from a previous install on another computer is available in the same Autodesk® folder as on the current machine, those files will not need to be re-downloaded.

The local installer is a full download or copy off all files needed for installation, **excluding Family Content Libraries**. This is the more logical deployment method when needing to deploy the installations to many pc's.

It is important to note that no matter the installation method, local, or web installer, the content will be downloaded for each installation on each machine. The content is on average about 3GB per library. The exact download size cannot be confirmed, as it is a compressed download. If we take the best case scenario with each library being \pm 1GB per library, and if 3 libraries are downloaded, a total of 3GB per machine of internet data will be required. This can grow very quickly; if we were to do this for 4 computers in the office, a total of 12GB bandwidth is required. It is therefore recommended that the content must only be downloaded and installed on one of the computers, then copied to the remainder of the computers or default locations.

The default Content Library can be found at: `C:\programdata\Autodesk®\rvt 20xx\`

Backups

Backups are possibly the most important and yet most overlooked requirement of data management for Autodesk® Revit®

There is a very true saying in the IT world:

“Data that is not backed up, is Data that you are prepared to lose”

It is, therefore, important to consider what should be backed up and what should not.

All default content should only be backed up once a year when changes are made and new versions are added. Templates and custom content should be backed up annually, quarterly and finally monthly, with offsite backups. Why would a company have to backup content and templates so regularly? Due to the amount of time, money, and effort spent on setting up content and templates, as well as the number of iterations that one would invariably take to achieve the final result. Now imagine that all that money, time and energy is completely wasted because a severe disaster strikes, either data gets stolen, or hardware malfunctions.

Note: An external HDD is **NOT** an acceptable backup storage solution.

Conclusion

Managing storage is and always has been a greatly overlooked aspect of Autodesk® Revit® data management. This document outlined some of the major challenges that users, CAD Mangers, BIM Managers and IT personnel might face when looking at data management for Autodesk® Revit. You were introduced to issues that you may have overlooked in the past. You will now have a better understanding of how the content system works with Autodesk® Revit® and your existing workflows.

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