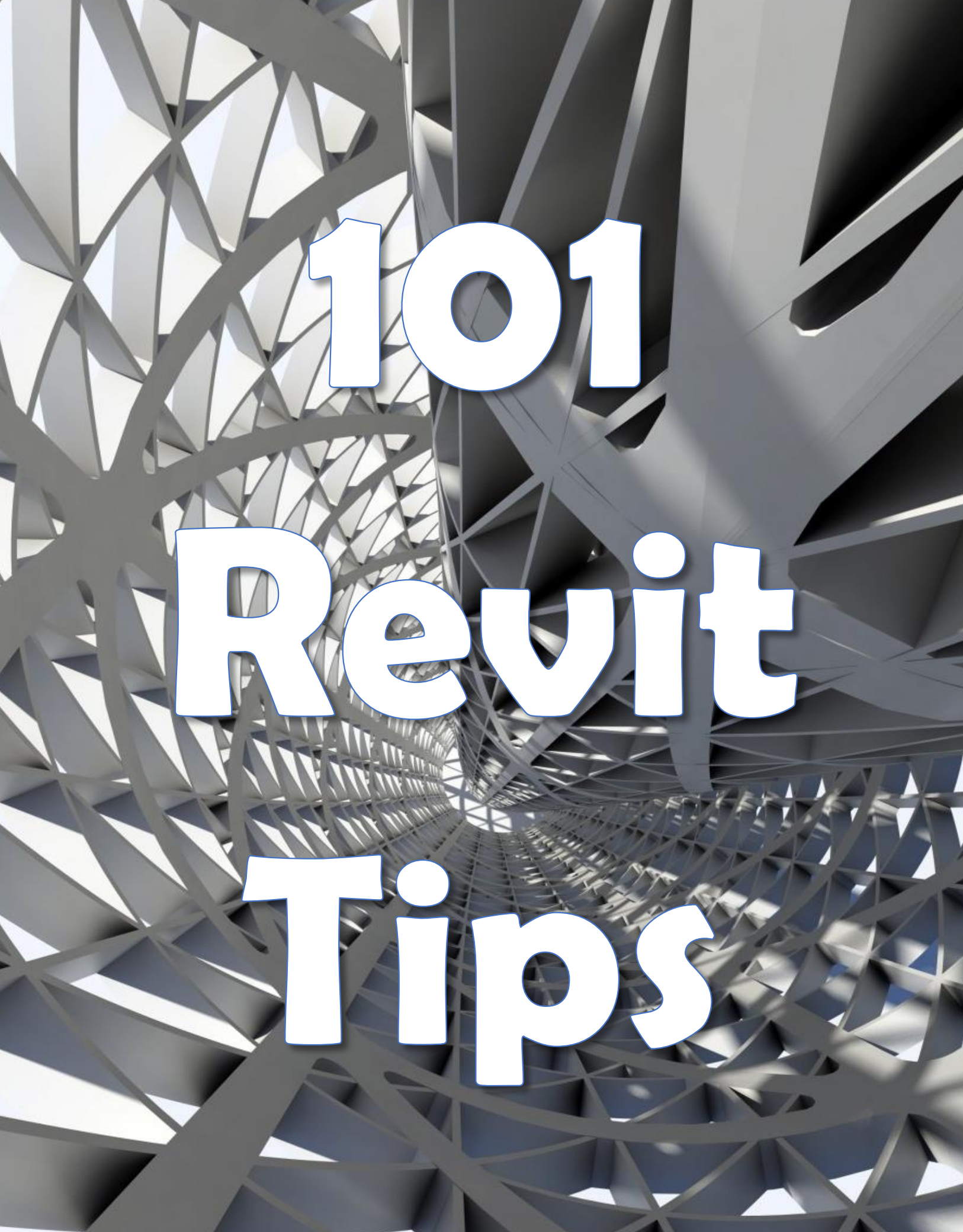
101
Revit
Tips

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101 BEST PRACTICE TIPS FOR REVIT MODEL MANAGEMENT

The information given below is time-sensitive as the technology and system requirements continually evolve. While I have made every attempt to validate all information, please verify and refer to the official Autodesk System Requirements posted on http://www.autodesk.com. Unless otherwise noted, all information applies only to the Autodesk® Revit® 2010 onwards.

As the design team acclimates to a BIM workflow, the adoption of a company strategy for model management will become more important. Effective management is required to ensure that the model data remains coordinated, well-structured, and efficient. Secondary benefits include reduced errors; improved consistency between team members; and gains in production efficiency. The intent of this document is to convey best practices for managing a model authored using Autodesk® Revit®.

BEST PRACTICE: BEFORE THE PROJECT BEGINS

1. HARDWARE

It's important that the hardware on which the Revit platform is running is up to at least the mini mum system requirement set by Autodesk.

To help users Autodesk has put together minimum system requirements for Revit 2008 onwards on both 32bit and 64bit systems.

Link: System requirements for Autodesk Revit products

Check your Graphics Card is on the Autodesk Certified Hardware list. You can check by clicking This Link: Find Recommended Hardware

2. GENERAL MANAGEMENT (MEMORY)

It is a good idea to close the program at least once a day (ideally when you take a lunch break) and before undertaking a memory intensive task, such as rendering, exporting, printing etc. Autodesk also recommends before performing any of the operations listed above, performance can be improved by reducing memory usage if you do the following:

- ✓ Close other applications currently running (but not being used).
- ✓ Shutting down or restarting your machine at the end of the day releases system resources.
- ✓ Turn off shadows for all printed views if not absolutely necessary.
- ✓ Detach local copies from central before printing and exporting to limit network resources and re duce project chatter between local and central files (use this tactic with caution because changes subsequent to detachment cannot be saved to the central file).

3. GENERAL GUIDELINES

- ✓ Images: reduce image size before importing into Revit.
- ✓ Once you are done using a design option, delete it.
- ✓ Saving to Central using the "Open - Save Page".
- ✓ Audit model once or twice a week.
- ✓ Restart Revit over lunch to reset cache.
- ✓ Compacting the file at the end of the day.
- ✓ Overwriting the model with a fresh copy.
- ✓ Pin an element to keep it from moving.
- ✓ Turn off shadows (for all views, and especially during printing).
- ✓ Link CAD files instead of importing them - choosing “current view only” when linking.
- ✓ Zoom into the part of the view where you are working. This will reduce display calculations.
- ✓ Start with generic types (walls, floors, columns etc.) and get more specific as you go on.
- ✓ Use Move command to move large numbers of objects, instead of dragging them.
- ✓ Export rendered images to disk, instead of capturing them inside the project.
- ✓ Import high resolution images into a separate ‘Images’ .rvt file.
- ✓ Perform rendering and walkthroughs in a separate file and then link the project to that file.
- ✓ Install the newest builds of Revit and service packs.
- ✓ Switch off Volume Calculations until exports are required.
- ✓ Minimise number of Levels within the models and omit levels not used.
- ✓ BIM Manager to perform periodic project/model health checks and audits.
- ✓ Continuously meet with Revit users, discuss problems and implement suggestions.
- ✓ Collate and document problems and challenges (set up a lessons learned register).
- ✓ Update standards and train people on changes and lessons learned.

- ✓ At the start of new projects, run kick-off BIM/Revit sessions.

4. PROJECT TEMPLATES

Project Templates should be employed & configured on all projects to ensure consistent project development, output, functionality and aesthetics by the BIM Manager/BIM Coordinator. More than one Project Template may be produced to separate content per project type. Eg. Healthcare, commercial, residential etc.

- ✓ Templates should include and define Annotation Styles, Dimension Styles, Fonts, Import/Export Settings, Line styles, Line Weights and Line Patterns. Object Styles. Tags. Avoid populating project templates with an excessive number of families that may or may not be useful for every project. Favor a minimal rather than a comprehensive template

- ✓ Drafting Views: Consider creating a standard drafting view for detail development.

- ✓ When setting a template, don't over load it with families. Include the 5-10 most commonly used types for System Families (e.g. Walls).

- ✓ Limit Component Families (e.g. Doors, Windows) to those that are used on nearly every project.

- ✓ Schedules: Set up and pre-format schedules for Windows, Doors, etc. so that they will fill themselves out when content is added to the model.

- ✓ For all preloaded content, ensure that parameters have been assigned so that schedules and keynotes will fill themselves out.

- ✓ Titleblocks: Include common sheet sizes (e.g. A0, A1), company logo, etc. Include examples of sheets that are consistent from project to project (eg. Cover sheet, floor plan, ceiling plan, detail sheets etc).

- ✓ The standard template only needs to have the general/standard elements which would be used on most if not all projects. Then anything else can be added when or if required.

- ✓ Set up appropriate View Template's for drawing sheets (eg. Shaded Elevations/detailed Shop drawing Elevations, Sections).

5. LINKING & IMPORTING

- ✓ Minimise the number of linked or imported files in a Revit model.

- ✓ Only import 'cleaned' and un-exploded AutoCAD dwg files into Revit, making sure all unnecessary layers and blocks are deleted, purged, audited beforehand.

- ✓ Think about what's in the dwg file before you insert the file into Revit and avoid unnecessary data such as hatching of AutoCAD specific line-work such as construction lines.

- ✓ Avoid exploding geometry imported from dwg files, as exploding will creates more elements.
- ✓ Only link essential dwg files into necessary views. Remove links when not required any more.
- ✓ Switch off visibility of 2D AutoCAD dwgs in perpendicular/elevation views. A 2D dwg file lined to a plan view will show as collinear lines in elevation, causing performance degradation.
- ✓ Unload all links if they aren't being used and reload them when required.
- ✓ When working on large projects think about breaking the model into separated project models and then linking them into one single central file.
- ✓ Don't link or import unnecessary files or families into your model.
- ✓ When working in a linked file environment use Wireframe or Shading display modes. Wireframe and Shading modes can be 3times faster than the Hidden Line or Shading with Edges modes.

6. VIEWS

- ✓ Unused Views: Name it or delete it. In addition, use the Close Hidden button to close views that are not currently being edited.
- ✓ Minimise the view depths to avoid showing unnecessary information.
- ✓ Close hidden views, as any changes to the model done not only updates the current view but will also update any views affected by those changes.
- ✓ Turn off shadows in views and when printing unless required for the final output drawings.
- ✓ When working in a 3D view, don't have shadows switched on, it will slow the model down as it will have to redraw the shadows every time you change the model or move/rotate the view.
- ✓ When navigating within a 3d View, use a section box to zero in on the area you're working. This reduces the amount calculations Revit needs to perform in the background.
- ✓ View Range: Reduce the view range to the minimum depth necessary to show the desired content.

7. FAMILIES

- ✓ Parametric families consume more resources than static families, but they provide flexibility that may reduce the number of families that need to be loaded into a project—finding a balance is key.
- ✓ Face-based families consume less resources than those that cut their hosts

- ✓ It may be unnecessary to model 3D geometry in all families, especially if the family only appears in one or two orientations (e.g. plan, elevation). However, 3D geometry may actually be more efficient than the extensive use of 2D detail elements. Practice both techniques to optimize families.

- ✓ Use In-Place families sparingly.

- ✓ Create family components instead of in-place families for repetitive components. When an in-place family is copied, it makes an entirely new entity each time, as opposed to referencing the type information from the first instance.

- ✓ Limit the use of detailed/nested/parameterised families to necessities only.

- ✓ Families require fewer resources than groups. Use families instead of groups where possible. Groups are very powerful, but updating large quantities of group instances consumes significant computing resources.

- ✓ When creating a family in 3D – think, does it really need to be 3D? If it's only going to be shown 2D then you don't need a 3D view. Creating a 2D version of a family is 20% smaller than the 3D version, so if you had multiple families in a project the 3D version would increase the model size considerably.

- ✓ Minimise over-complicated components – Remember…KISS! (Keep It Simple Stupid).

8. OVERMODELLING

- ✓ Complex geometry: Improve performance by ungrouping and removing the parametric associations of copied objects.

- ✓ Minimise multiple parametric relationships.

- ✓ Multiple constraints: Minimise the constraints within a model.

- ✓ Don't use 3D geometry when detailing is sufficient.

- ✓ Minimise 2d lines, annotation, complexity of geometry and regions.

- ✓ Cut down on constraining within the model.

- ✓ Unnecessary locking of elements.

- ✓ Use Groups sparingly.

- ✓ When creating detail views, model hatches with filled regions rather than lines.

- ✓ Limit joined geometry in your model; don't just join something – think, does it need to be joined?

- ✓ Levels in Elevation: Avoid using levels to indicate every vertical reference in elevation (e.g. window head and sill elevations); such a technique will require a user to hide irrelevant levels in every elevation and section view. Develop and use Spot Elevation tools to label these items.

- ✓ Railings: Model railings to provide adequate detail for general use (elevations, plans), but avoid the temptation to model all details within the railing. Add two-dimensional details where required (plans, sections, elevations, details) to fully describe railings.

- ✓ Volumes: Setting the Area and Volume Computation option to calculate Areas only may improve performance; however, this reduces much of the analytical functionality of Revit MEP.

- ✓ Consider breaking up the model into multiple files, especially on large models. For example, if you have a building with multiple wings, model those in separate models and link them into the central model.

9. SPLITTING THE REVIT MODEL

General recommendations, per Autodesk: "Consistent customer practice is to break up a large model into multiple files of about 160 MB each for 32-bit Revit or 200 MB for 64-bit Revit, then link together the resulting project files. Such a procedure will work best if the user can work on one file while the other links are unloaded for a majority of the time. Engineering consumers of architectural models may have to maintain one or more constantly loaded links, which may affect model size estimation and thresholds for those disciplines."

The decision to split a model should be made early in the design process, ideally in the Pre-Design or Schematic Design Phase with all consultants aware of this decision and its ramifications. Splitting the model later in the design process adds significant time and cost. Specific conditions that may trigger a multiple-model project include:

- Separate buildings (a "campus" project where each building would be a separate model, linked together on a "master site plan" project);
- Collaboration between geographically disperse project teams (A single building being worked on by multiple offices that are not on the same WAN);
- Unusually large files (after all other model management practices have failed, because of the particular needs or scope of a project, it may still not be possible to keep the model to a reasonable size); and
- Phased projects where there is a natural and specific split of the design and/or construction.

Where file size is the primary factor, model splitting should be considered a last resort and is not to be undertaken lightly. All model management and modeling best practices methods and procedures should be exhausted before model splitting is undertaken. If a firm encounters project types and sizes that require this approach on a consistent basis, I

strongly recommend working in a 64-bit environment with an appropriate hardware specification in accordance with Autodesk system requirements (or higher).

10. WORKSETS & WORKSHARING

- ✓ Use Worksets to allow multiple users to work on a single model at any one time. This is a valuable tool which can help with workflow as different users take ownership of different elements within the model, allowing them to edit those elements before relinquishing them back to the central file.
- ✓ When creating a Workset, leave the Visible by default in all views option selected. Clearing this option can render the Workset completely invisible and problematic in multi-discipline workflows where feature visibility can be of paramount importance.
- ✓ It's a good idea to create a new local file from the central model every few days.
- ✓ Regularly compact the central and local files to reduce file size and memory usage.
- ✓ Put linked models on their own workset.

11. REVIT WARNINGS

- ✓ Minimise/fix warnings. Less than 10 is ok, more than 1000 is not!
- ✓ If Revit flags up with a warning as you're modelling don't just ignore it, as later on down the line you may find out that something has gone wrong.

12. PURGE & AUDIT

- ✓ Just like in AutoCAD, it is a good idea to run a Purge and Audit regularly to help reduce the files and reduce the chances of the file becoming corrupt.
- ✓ Purge unused familys and groups regularly.

13. FILE MAINTENANCE

The following are recommendations for file maintenance mirroring those provided by a client with significant Revit project experience[2]. For small projects, this file maintenance schedule may be largely unnecessary, while it may need to be accelerated to keep a very large model manageable. Also note that these maintenance procedures may be applied to files received from consultants to ensure optimal performance.

- ✓ Periodic File Maintenance (e.g. every sheet set issue): In addition to weekly maintenance tasks, perform the following steps:

- ✓ Audit the central file;
- ✓ Create a backup of the central file;
- ✓ Create a new central file; and
- ✓ Have all users create new local files from this central file.

Every Two Weeks: In addition to weekly maintenance tasks, perform the following step: Create a backup of the central file.

Weekly:

- ✓ Audit the central file;
- ✓ Perform a Coordination Review, if using Revit to maintain coordination with consultants;
- ✓ Perform an Interference Check, if using Revit to detect collisions;
- ✓ Review and resolve warnings;
- ✓ Delete unused or redundant views;
- ✓ Purge unused elements that will not potentially be used in later phases of the project; and
- ✓ Compact the central and local files.

Daily:

- ✓ Audit local files upon opening them; and
- ✓ Compact local files when closing them for the day.
  Backups and Archives
- ✓ At each issue date, or as required, use the Detach from Central option to create an independent, archive-ready central file.
- ✓ Backups can be generated via the same process, but this is generally unnecessary, as each user's local file can be considered to be a backup file. If a central file becomes corrupt, it is often most efficient to convert the most-recently-saved local file for that project into a new central file, rather than attempting to recover a backup file that may be obsolete.

14. FINAL NOTE:

A model Audit should be undertaken on a monthly basis with a check list and images, by creating a standard Model Audit Template/Report. Make sure all Revit users are properly trained on how to use Revit, making sure they follow correct company protocols and best practice method listed above.

15. REFERENCES:

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2. D|C|CADD. 2010, March. *Best Practices For Revit Model Management*. [ONLINE] Available at: http://bimsg.org/wp-content/uploads/2013/08/best-practices-for-revit-model-management.pdf

3. Spencer, G. (2012). *Revit Performance Tips. General tips and tricks to help improve the way Revit performs.* CADLINE.