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Automatic Checking of your BIM 360 Models

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Learning Objectives

- Learn about model checking your BIM 360 models.
- Discover ways you can build your own custom checks and model checking tasks.
- Learn about the details of using this new tool.
- Discover tips and tricks.

Description

With almost a million downloads worldwide, the Autodesk BIM interoperability tools—which include the Model Checker for Revit software—have become the industry standard in reviewing Revit models. This tool is now available for your BIM 360 models! Built on Forge, the Model Checker on Forge tool can review all your models and generate reports on their compliance with the checks you define. Whether pass/fail, counts, or lists, you can view the check reports individually and easily put them into a Microsoft Power BI dashboard. The Model Checker on Forge lets you select multiple models and define schedules, and, of course, it runs automatically in the Autodesk cloud. This session will be a thorough study of this amazing new tool, including how to use it and tips and tricks.

Speakers



T.J. Meehan AIA, LEED AP

Sometimes you see him from the corner of your eye, but when you turn to look, he is gone. T.J. is more idea than man. More concept than person. On the edges of being awake and dreaming, you will find him. That feeling deep in your soul that you get when you are not aligning your data correctly, or when you are using Excel ineffectively... *that feeling is T.J.*

In the times when he is not a whisper between worlds, T.J. is the Vice President of Technology Solutions at CADD Microsystems where he focuses on strategic planning with clients, and developing processes related to design/build/operate (DBO) workflows. In addition, he manages custom design solution and execution through software development and creates innovative solutions to meet the unique challenges of clients.

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Jason Kunkel

From the Latin “K”, meaning one thousand, and the Urdu “unkel”, meaning “uncle”, Jason always strives to be as helpful and all-knowing as 1,000 of your Dad’s favorite brothers would be. Whether it’s being a sounding board for your Revit issues, or lending you money to buy Hot Pockets and Mountain Dew for your all-night coding bender, Kunkel is there for you.

When not frightening small children with tales of dial-up speeds, Jason is the team lead for the AEC consultants at CADD Microsystems; he supports them on technical and standards development issue, helps coordinate and align skills with industry needs, and oversees staffing, scheduling, and quality control. He is also integral in application development and support team of programmers for other applications. Finally, he performs process and standards assessments for AE firms, delivers education, outreach, and training, in addition to presentations.

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 <https://rvit.wordpress.com/about/>

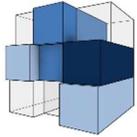
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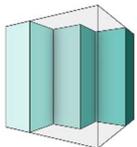
The BIM Interoperability Tools

Developed and maintained by CADD Microsystems and published by Autodesk, the suite of Revit add-ins known as the BIM Interoperability Tools allow all Revit users a more structured way to *classify* data within their model, *validate* the accuracy of that data, and *deliver* the necessary information to users downstream.



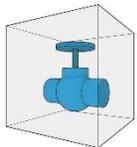
Autodesk **Classification Manager** for Revit

Quickly apply data from multiple classification systems to all your elements



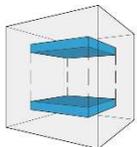
Autodesk **COBie Extension** for Revit

Set up your Revit models to capture COBie data and then export that data to a COBie compliant spreadsheet



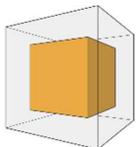
Autodesk **Equipment Data Tool** for Revit

Designate your equipment families with a subcategory and then manage a group of parameters for each – *coming soon*



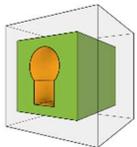
Autodesk **Spatial Data Tool** for Revit

Quickly apply a standard set of parameters to all your Rooms and Areas and sync the data between them – *coming soon*



Autodesk **Model Checker** for Revit

Automatically check your Revit models based on a set of BIM requirements and generate a compliance report



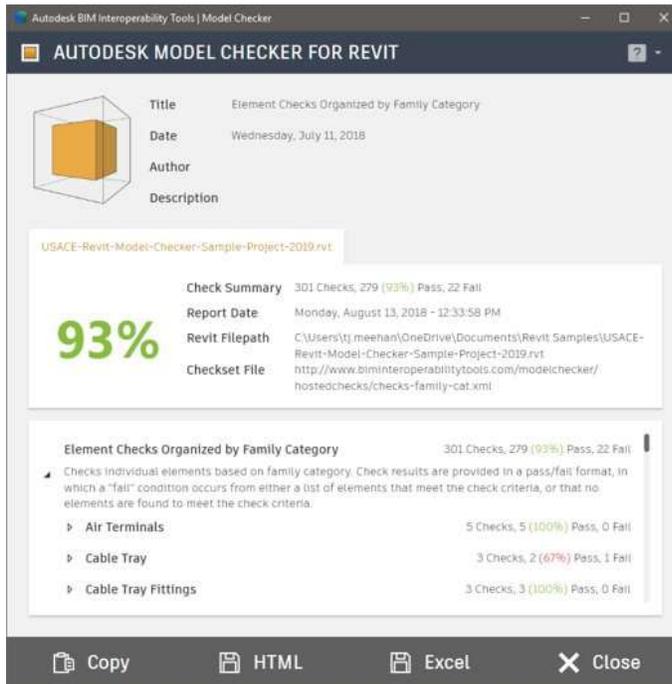
Autodesk **Model Checker Configurator** for Revit

Make your own checksets for the Autodesk Model Checker for Revit

The BIM Interoperability Tools are available for free to all Revit users and can be downloaded from the Autodesk Desktop App, manage.autodesk.com, or from biminteroperabilitytools.com. They have an extensive userbase, currently over 1,000,000 downloads, and have been integrated into the deliverable requirements and standards of owners and firms the world over.

Model Checking Overview

Autodesk Model Checker for Revit



The Model Checker collects and filters elements based on parameter values and other information in those elements. Depending on the criteria in the Model Check checklist file (XML format), the user will get a simple report or a PASS/FAIL result in the check.

Reports can be run directly on a Revit model, allowing project teams to check compliance at any time during the project. It is a powerful tool for firm and owner BIM Managers to track quality of Revit models and to make sure things stay on track.

There are dozens of pre-built checksets available for use as-is or to download and customize. They are a great way to piece together your own checkset, or to learn from.

Autodesk Model Checker Configurator

The Configurator is a standalone application used to create and modify Model Checker Configuration files. The files are saved in easy to edit XML format that can be shared via email, saved on a network, etc.

Checks can be developed as PASS/FAIL, COUNT, or LIST.

Checks can be built using a Wizard to walk you through creating a check, you can select from a series of Pre-Built checks, or you can use the Advanced interface to create your own filters for your checks.



Why move to Forge?

The current Model Checker is a very effective tool; however, it has some limitations as many desktop-based applications do:

- Revit must be installed and running actively. A workstation running a check cannot be doing anything else in Revit at that time.
- It can be challenging to access BIM 360 models. A lot of progress has been made in this, but it's still not 100% supported with all the Model Checker features.
- Until recently, a user had to be available to run the checks. A recent addition of automation and API access to the Model Checker helps to alleviate this, but users still need the skill to setup automation or to create a custom application with the API.
- Until recently, checks could not be run on a schedule. Even now, with the newly released automation feature, running a check on a schedule has limitations based on workstation availability, setting up Windows Task Manager, and others.

What is Forge?

Forge is Autodesk's collection of web-based APIs that allow developers to access cloud-based services for their applications. There are several APIs that facilitate migrating the Model Checker to the cloud, but the one doing the heavy lifting is Design Automation for Revit. You can think of Design Automation for Revit as a UI-less version of Revit running on a web server. That allows developers to create add-ins for Revit that don't have to be run on a desktop combining the features needed in Revit with the convenience of a cloud-based service.



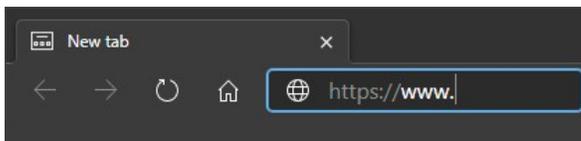
Model Checker on Forge (MCF)

The intent of moving the desktop application to Forge is to allow more flexibility for both Revit and non-Revit users to run their checksets on their models, while still maintaining the same checkset XML structure and output that the desktop version of Model Checker provides.

Accessing Model Checker on Forge

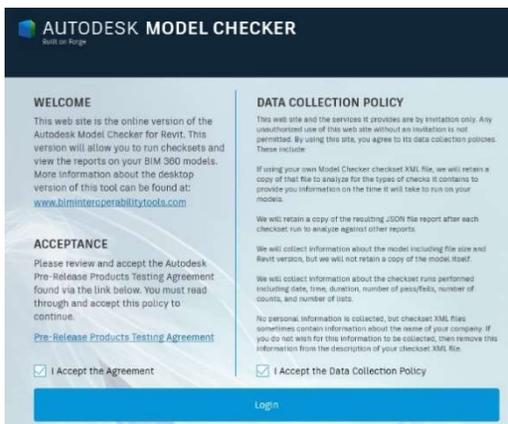
MCF is currently in development in a closed alpha testing phase, however the basic workflow is not anticipated to change when the application becomes available to more users.

Access URL



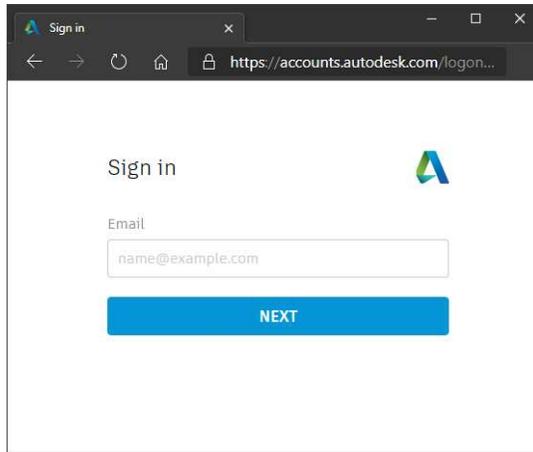
Model Checker on Forge is a web-based application. No software is needed to be installed on your workstation, not even Revit.

“Screen Door”



Users must accept the Data Collection Policy to use the service. No personal data is actively targeted or collected. The service does collect information on the models tested, the checksets used, and amount of time taken to run checks. This is to help refine approximations of time needed to run checks in the future.

Login



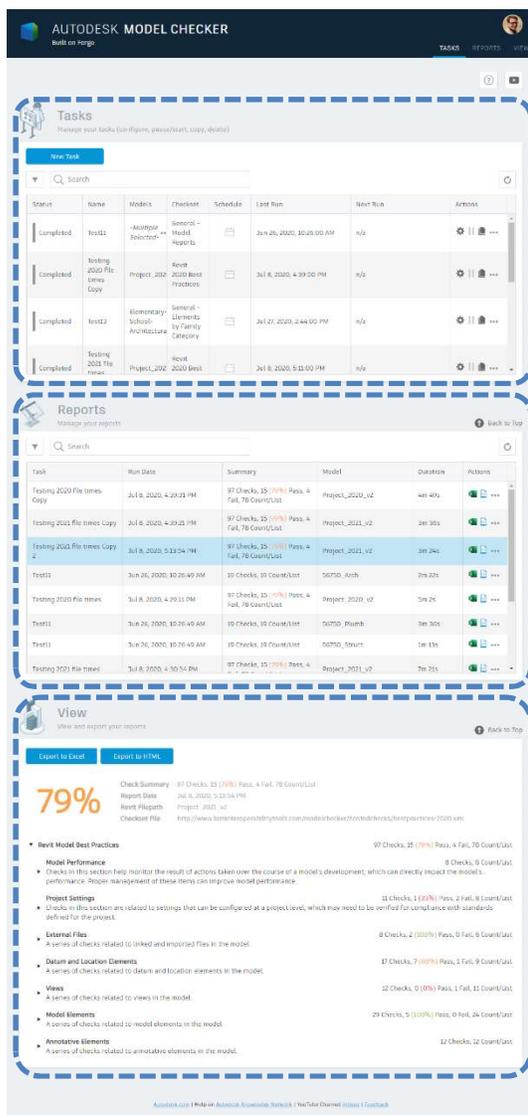
MCF is designed exclusively to access Revit models hosted in BIM 360. On login, users are giving permission for MCF to access hubs and projects and any file that user has access to within those BIM 360 projects. Depending on the settings used in checks, MCF may also write files to the same project.

Using Model Checker on Forge

The interface for MCF is designed to be easy to understand simply by accessing it. Users familiar with the Model Checker on the desktop should find many of the features familiar.

Main Page

Once logged in, users are presented with the main application page that is broken up into three sections: **Tasks**, **Reports**, and **View**.



The screenshot shows the Autodesk Model Checker interface with three main sections:

- Tasks:** A table listing tasks with columns for Status, Name, Models, Checkset, Schedule, Last Run, Next Run, and Actions. Tasks include 'Testing 2020 File times Copy', 'Testing 2021 File times Copy', and 'Testing 2022 File times Copy'.
- Reports:** A table listing reports with columns for Task, Run Date, Summary, Model, Duration, and Actions. Reports include 'Testing 2020 File times Copy', 'Testing 2021 File times Copy', and 'Testing 2022 File times Copy'.
- View:** A detailed view of a report showing a 79% completion rate. It includes a 'Check Summary' and a list of categories such as 'Revit Model Best Practices', 'Model Performance', 'Project Settings', 'External Files', 'Datum and Location Elements', 'Views', 'Model Elements', and 'Annotative Elements'.

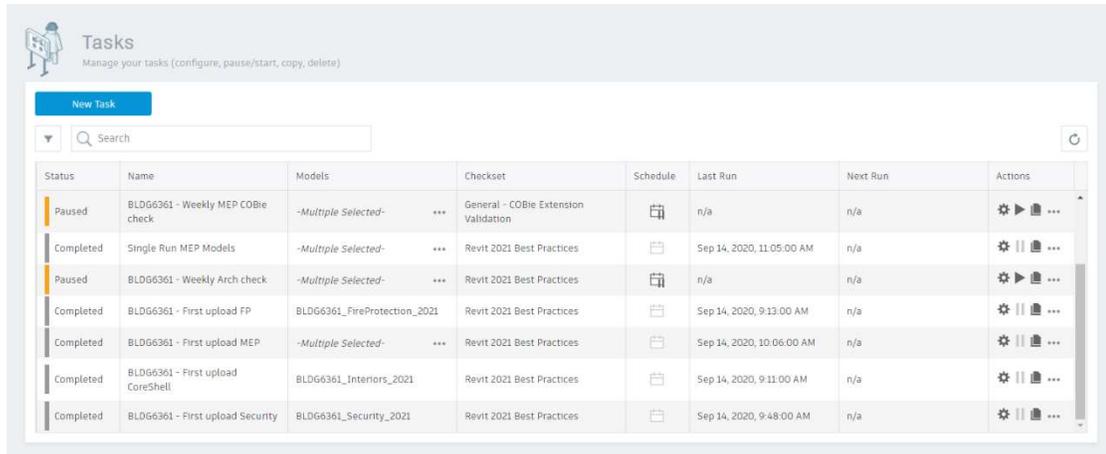
Tasks
name, model(s), checkset, "trigger"

Reports
manage the Reports generated by the Tasks

View
look at the reports and export if needed



Tasks



The screenshot shows the 'Tasks' management interface. At the top, there is a 'New Task' button and a search bar. Below is a table with the following columns: Status, Name, Models, Checkset, Schedule, Last Run, Next Run, and Actions. The table contains several rows of task data, including 'Paused' and 'Completed' tasks with various names and associated models and checksets.

Status	Name	Models	Checkset	Schedule	Last Run	Next Run	Actions
Paused	BLDG6361 - Weekly MEP COBie check	-Multiple Selected-	*** General - COBie Extension Validation	📅	n/a	n/a	⚙️ ▶️ ⋮
Completed	Single Run MEP Models	-Multiple Selected-	*** Revit 2021 Best Practices	📅	Sep 14, 2020, 11:05:00 AM	n/a	⚙️ ⏸️ ⋮
Paused	BLDG6361 - Weekly Arch check	-Multiple Selected-	*** Revit 2021 Best Practices	📅	n/a	n/a	⚙️ ▶️ ⋮
Completed	BLDG6361 - First upload FP	BLDG6361_FireProtection_2021	Revit 2021 Best Practices	📅	Sep 14, 2020, 9:13:00 AM	n/a	⚙️ ⏸️ ⋮
Completed	BLDG6361 - First upload MEP	-Multiple Selected-	*** Revit 2021 Best Practices	📅	Sep 14, 2020, 10:06:00 AM	n/a	⚙️ ⏸️ ⋮
Completed	BLDG6361 - First upload CoreShell	BLDG6361_Interiors_2021	Revit 2021 Best Practices	📅	Sep 14, 2020, 9:11:00 AM	n/a	⚙️ ⏸️ ⋮
Completed	BLDG6361 - First upload Security	BLDG6361_Security_2021	Revit 2021 Best Practices	📅	Sep 14, 2020, 9:48:00 AM	n/a	⚙️ ⏸️ ⋮

This is the primary location to manage the entire task list. It lays out both the history of checksets run as well as any checksets scheduled to run. The table identifies:

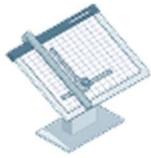
- **Status** of the task: Completed, Running, Paused, etc.
- The task **Name**
- **Models** associated with the task
- The **Schedule** status
- The **Last Run** date/time of this task
- The **Next Run** date/time of this task

In addition, each task has a series of **Actions** associated with them.

- ⚙️ **Edit** the task.
Note that models or checkset associated with the task cannot be changed.
- || ▶️ **Pause/Resume** the task if it is scheduled to run
- 📄 **Duplicate** the task to make another version with similar settings
- ✕ **Remove** the task

The list can be sorted and filtered to make finding a specific task easier.

Using  in this section is how a new task is created.



Reports

Reports
Manage your reports

Search

Back to Top

Task	Run Date	Summary	Model	Duration	Actions
Single Run MEP Models	Sep 14, 2020, 11:05:35 AM	97 Checks, 8 (42%) Pass, 11 Fail, 77 Count/List, 1 Error	BLDG6361_Electrical_2021	1m 23s	  
BLDG6361 - First upload MEP	Sep 14, 2020, 10:06:54 AM	97 Checks, 7 (37%) Pass, 12 Fail, 78 Count/List	BLDG6361_Plumbing_2021	0m 57s	  
BLDG6361 - First upload MEP	Sep 14, 2020, 10:06:54 AM	97 Checks, 8 (42%) Pass, 11 Fail, 78 Count/List	BLDG6361_Mechanical_2021	2m 55s	  
Single Run MEP Models	Sep 14, 2020, 11:05:35 AM	97 Checks, 7 (37%) Pass, 12 Fail, 78 Count/List	BLDG6361_Plumbing_2021	0m 54s	  
AU 2020 Deep Dive	Oct 9, 2020, 12:30:27 AM	97 Checks, 12 (63%) Pass, 7 Fail, 78 Count/List	BLDG6361_CoreShell_2021	2m 43s	  
BLDG6361 - First upload CoreShell	Sep 14, 2020, 9:11:43 AM	97 Checks, 7 (37%) Pass, 12 Fail, 78 Count/List	BLDG6361_Interiors_2021	2m 36s	  
Single Run MEP Models	Sep 14, 2020, 11:05:35 AM	97 Checks, 8 (42%) Pass, 11 Fail, 78 Count/List	BLDG6361_Mechanical_2021	0m 58s	  
AU 2020 Deep Dive	Oct 9, 2020, 12:30:41 AM	97 Checks, 8 (42%) Pass, 11 Fail, 78 Count/List	BLDG6361_Mechanical_2021	0m 51s	  
BLDG6361 - First upload MEP	Sep 14, 2020, 10:06:54 AM	97 Checks, 8 (42%) Pass, 11 Fail, 77 Count/List, 1 Error	BLDG6361_Electrical_2021	2m 2s	  

Once a task has run successfully, this section lists the results. Like the Tasks table, this list can be filtered and sorted to find the specific report. The table identifies:

- The **Task** name associated with the report
- The **Run Date** of the specific report
- The Model Checker **Summary**
- The **Model** that the check was run against. Note that if a Task has identified multiple models, each one will be listed individually with its own report
- The **Duration** of the run

In addition, each report has a series of **Actions** associated with them.



Export to Excel



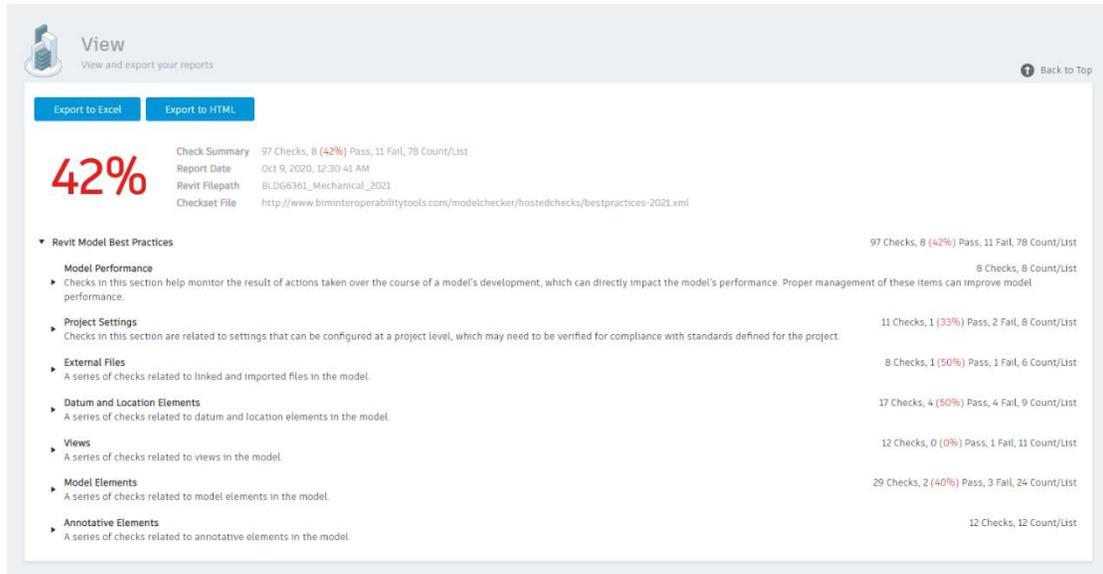
Export to HTML



Remove the report



View



View
View and export your reports

Export to Excel Export to HTML

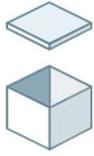
42% Check Summary: 97 Checks, 8 (42%) Pass, 11 Fail, 78 Count/List
 Report Date: Oct 9, 2020, 12:30 41 AM
 Revit Filepath: BLDG6361_Mechanical_2021
 Checkset File: http://www.biminteroperabilitytools.com/modelchecker/hostedchecks/bestpractices-2021.xml

- Revit Model Best Practices** 97 Checks, 8 (42%) Pass, 11 Fail, 78 Count/List
 - Model Performance** 8 Checks, 8 Count/List
 Checks in this section help monitor the result of actions taken over the course of a model's development, which can directly impact the model's performance. Proper management of these items can improve model performance.
 - Project Settings** 11 Checks, 1 (33%) Pass, 2 Fail, 8 Count/List
 Checks in this section are related to settings that can be configured at a project level, which may need to be verified for compliance with standards defined for the project.
 - External Files** 8 Checks, 1 (50%) Pass, 1 Fail, 6 Count/List
 A series of checks related to linked and imported files in the model.
 - Datum and Location Elements** 17 Checks, 4 (50%) Pass, 4 Fail, 9 Count/List
 A series of checks related to datum and location elements in the model.
 - Views** 12 Checks, 0 (0%) Pass, 1 Fail, 11 Count/List
 A series of checks related to views in the model.
 - Model Elements** 29 Checks, 2 (40%) Pass, 3 Fail, 24 Count/List
 A series of checks related to model elements in the model.
 - Annotative Elements** 12 Checks, 12 Count/List
 A series of checks related to annotative elements in the model.

Selecting a specific report in the Reports section will load it into the View panel. These results will, of course, vary depending on what model and checkset were used to run the specific task.

The MCF report view is intended to look as identical as possible to the desktop version of the Model Checker reports and should be immediately familiar to those users.

Once a report has loaded in the View section, you can navigate it to review, export to Excel, or export to HTML.



New Task

The second page in MCF is the **New** task page.

AUTODESK MODEL CHECKER
Built on Forge

New
Create new Model Checker task

Save and Close Cancel

Task Name ✓
My new task

Models ✓

BIM360 Recent Models

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Project Files

- Architecture
- Fire Protection
- MEP
- Consumed
- Security
- Shared

List of models to your task
Drag-and-drop models here that you want added to your task

Reset List

- BLD06361_Mechanical_2021
- BLD06361_Electrical_2021

Checkset ✓

Public library My Library

- Denver Airport (DEN) - Assets
- Lima Airport (LAF) - BIM PnP
- Penn State (PSU) - BIM Standards
- The Ohio State University (OSU) - Project Delivery Standards
- State of Tennessee (TN) - BIM Standards
- US Army Corps of Engineers (USACE) - Section 2 Requirements
- Dutch Revit Standards (NLRS)
- Veterans Affairs (VA) - Space Attributes
- Western Michigan University (WMU) - Model Fidelity
- TRIRIGA Data Validation
- FM Systems Model Preparation
- Revit 2021 Best Practices
- Revit 2020 Best Practices

Current Selection

Revit 2021 Best Practices

Title
Revit 2021 Best Practices

Date
Jul 30, 2020

Author
Autodesk

Description
Checks to review modeling best practices and integrity.

Trigger ✓

Recurrence

Choose a Start Time
2:24 PM

Choose a Frequency
Daily

Every X Days
Every 1 day

Choose a Range
Start 10/18/2020 No end

Export Reports ✓

File
 Excel XLSX

Location
Same folder as model

HTML

Email Settings

Email me when a run completes

Include my exported reports (Excel XLSX and/or HTML) as attachments

Save and Close Cancel

Autodesk.com | Help on Autodesk Account Settings | YouTube Channel | Jobs | Feedback

Task Name

Models

Navigate through your BIM 360 hubs and project to select the models to associate with this task. Note that only models in the same project can be in a single task. Create a new task for a new BIM 360 project.

Checkset

Checksets from the Model Check Public Library can be used or you can upload and save your own XML checksets to run in this task

Trigger

When will this task run? Right away or on a schedule? Once or multiple times?

Export Reports

Excel or HTML versions of the report saved to the BIM 360 project

Email Settings

Get an email notification when the task has run with or without exported copies of the report

Lessons Learned

As this application is currently being developed, the team is still identifying all the lessons learned, but has a few key takeaways:



Requires you to have your own Forge Account

Design Automation uses Cloud Credits to pay for the cost of the web server processing. To accommodate firms and users running their own checks on this service, a Forge account needs to be created to tie the usage to Cloud Credits.

It is free to sign up for a Forge account and from initial testing, most runs are 5 or less minutes, which is about 50 cents (\$6/hour), but pricing may change.



Privacy and Data is a big concern

No personal information is collected. This is very important to the design team.

The team does analyze the check runs, the checksets, and the general structure of the models to better estimate durations and what it will cost. If there is any identifying information in the naming or content of the tasks or the checkset XML, that data will be visible to the development team. So, users should be sure to name these as anonymous as desired.



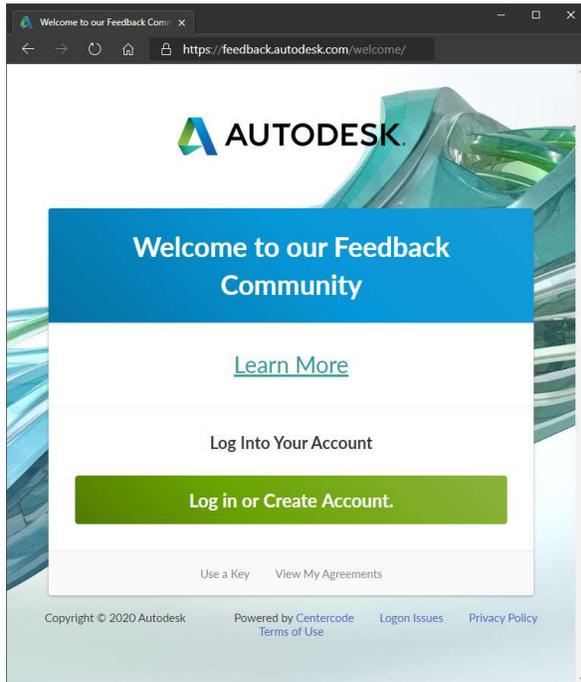
Design Automation on Forge has Limitations

Design Automation on Forge currently cannot understand the Revit file version, so each model is technically upgraded during the check.

However, the model is essentially copied to the Design Automation servers, and then deleted when done. No modifications are saved back to the active model in the BIM 360 project.

What's Next

Public Beta



The team expects to release the tool into a public beta soon. This will be managed through Autodesk's Feedback Community, <https://feedback.autodesk.com>

Additional Resources

To learn more about the Autodesk Model Checker, and to start building your own checksets in preparation of possibly using Model Checker on Forge, please review the following resources:

BIM Interoperability Tools Web Site

<https://www.biminteroperabilitytools.com/>

Autodesk Knowledge Network

<https://knowledge.autodesk.com/community/collection/model-checker-for-revit>

<https://knowledge.autodesk.com/community/collection/model-checker-configurator>

BIM Interoperability Tools YouTube channel

https://www.youtube.com/playlist?list=PL0RZIBv0pCfs3L_P0jVorPrb0yAeUTn9q

https://www.youtube.com/playlist?list=PL0RZIBv0pCfs3L_P0jVorPrb0yAeUTn9q

CADD Microsystems blog for insight into working with the Model Checker

<https://www.caddmicrosystems.com/blog/?s=model+checker>