

M-Star geometry catalog + Excel case definition

This document explains how to combine user geometry catalogs with the Excel defined simulation setups. The following common use cases can be implemented:

- Common case setups defined in Excel format
- Perform large sweeps with varying geometries

Quick Start

Here is a quick guide on how to perform large scale geometry sweeps with M-Star. This is supported in version 3.3.139. This package contains the following data :

- Documents/ Excel/Msb documents
 - Geometry/ Folder for all geometry
 - Impellers/ Folder for scaled geometry (assumes diameter = 1m)
 - Normal/ Folder for geometry imported as is (no diameter scaling available)
- 1) Configure Geometry Catalog and Document Catalog Paths on the Edit->Preferences form. Set the geometry and document catalog paths to the folders above

Preferences		×
General 3D Rendering Colors Model Defaults Solver	□ Save copy of model on export □ Shift model to positive quandrant Geometry Catalog Path C:\Users\user\Desktop\Catalogs\Geometry Document/Excel Catalog Path C:\Users\user\Desktop\Catalogs\Documents Default New Document Properties Font Size 12	
	OK Cancel	

The Geometry path is a folder that contains all the geometry you want available in the geometry catalog. Set this to the Geometry/ folder in the zip file.

The Document/Excel path contains all of your Excel documents that define the geometry sweeps. Set this to the Documents/ folder in the zip file.



- 2) Go to New from Excel Catalog
- 3) Select GeometrySweep.xlsx
- 4) Click "Export all cases in selected xlsx file"
- 5) Choose export directory
- 6) Confirm cases are created as expected

Model Generator Check Form		>
ØAll models created and exported successfully		
Case Name	Created: Fri Jan 7 12:38:13 2022	^
📀 test-2-FDT.IGS	Colump: Eluid NewtonianNu	
♥ test-1-FBT.IGS	Comment Type: Fluid Component Index: -1 Component Reference: valid Property Name: NewtonianNu Property Value: 9.999999999995E-7 Property Vector Index: -1 Applied: yes Error: Ignored: no Column: Group Component Type: Group Component Index: -1 Component Index: -1 Component Index: -1 Property Value: 50 Property Vector Index: -1 Applied: no Error: No property name givenColumn could not be parsed	~
		ОК

Adding more geometry to catalog

The geometry catalogs are defined by folders with catalog.ini and geometry files.



The catalog.ini file defines how the geometry files (*.igs, *.step, etc) in the same directory are to be treated. In the case of the Impellers folder, these geometries are setup as "ScaledImpeller" so that the resulting objects in are M-Star will be scaleable by diameter.



; Default: normal import process ; ScaledImpeller: geometry will scale on diameter. ; Input geometry must have a diameter = 1 meter ImportType=ScaledImpeller ; Set to 1 to enable addition of hub geometry AddHub=1 ; Set to 1 to enable addition of shaft geometry AddShaft=1

Figure 1 content of catalog.ini

To just import geometry as is, you can change the ImportType to Default. See below for an example. This file is from the Geometry/Normal/catalog.ini location.

```
; Default: normal import process
; ScaledImpeller: geometry will be able to scale
based on diameter.
ImportType=Default
; Set to 1 to enable addition of hub geometry
AddHub=0
; Set to 1 to enable addition of shaft geometry
AddShaft=0
```

Add your geometry files to the appropriate directory to include them in the geometry catalog. The supported file types are:

- STEP (*.stp, *.step)
- IGES (*.igs, *.iges)
- STL Mesh (*.stl)

Each of the files can be referenced by filename in the excel catalog.

Defining more cases in the Excel Catalog

Open the Documents/GeometrySweep.xlsx file to edit the defined cases catalog. The Excel format is fully defined in the documentation -- <u>https://docs.mstarcfd.com/workflow/excel_catalog.html</u>. Quick overview:

- Each row in the table defines a new case.
- The Name column is used as the directory and msb file name of the exported data.
- Columns starting with "Static" configure the static body
- Columns starting with "Moving" configure the moving body
- The geometry should be referenced by name in the "Static 1" or "Moving 1" columns.



In this example, we only have a few geometries to test, so in the "Moving 1" column, we have defined the geometry file names. The geometry catalog is searched for these names.



Other commonly used inputs are:

- Moving 1 Location Y
- Fluid NewtonianNu

Moving body Y location Fluid viscosity

Running the cases with the built-in solver queue GUI

Export the Case Data

- 1) Open the M-Star GUI
- 2) File -> New from Excel catalog
- 3) Select the Excel catalog file
- 4) Click Export all cases in selected xlsx file
- 5) Choose directory
- 6) Confirm cases were exported correctly

At this point you should have a folder that contains all the sub directories with their case data

Run the cases through the solver queue

- 1) Open the M-Star Solver Queue GUI
- 2) Configure the used resources. Open the Settings -> Configuration menu item
 - a. Select the GPUs to use
 - b. Click OK
- 3) Click the Add button
- 4) Select the folder with all the sub directory cases
- 5) Click Start



Next Steps/Tips

- Read about using Base Documents in the documentation. This allows more complex starting cases to build on using the Excel catalog cases
- Look into using the Scaled Impeller catalog types in order to create scalable impellers
- Use a shared network drive or folder to define commonly used geometries and cases for your entire team