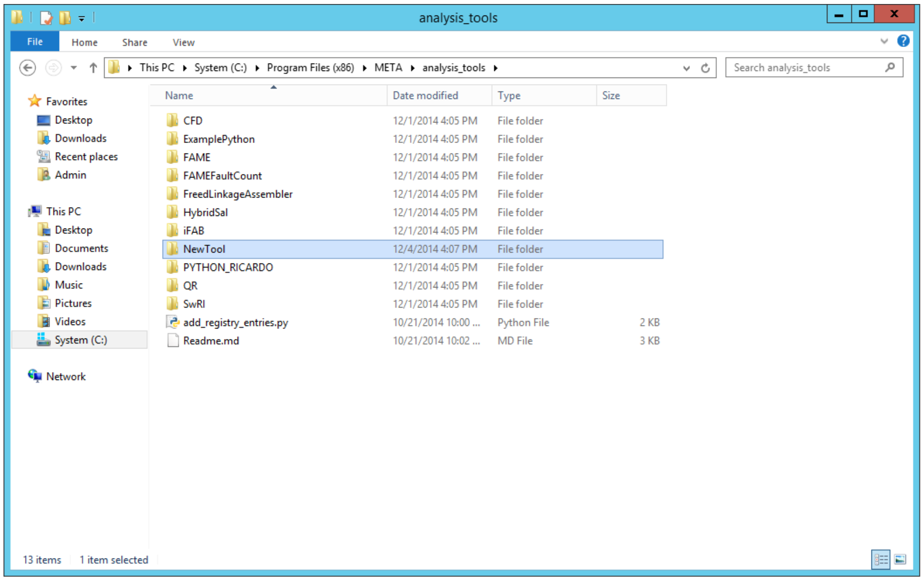
Analysis Tools

Analysis tools are run as part of a CyPhy test bench. Each tool defines which artifacts should be extracted from the CyPhy model and what the entry point of the tool is. To add a new analysis tool follow the instructions below.

1. Create Directory

Create a new directory at `META tool install location\analysis_tools`, e.g. `C:\Program Files (x86)\META\analysis_tools` and name it appropriately.



Name	Date modified	Type	Size
CFD	12/1/2014 4:05 PM	File folder	
ExamplePython	12/1/2014 4:05 PM	File folder	
FAME	12/1/2014 4:05 PM	File folder	
FAMEFaultCount	12/1/2014 4:05 PM	File folder	
FreedLinkageAssembler	12/1/2014 4:05 PM	File folder	
HybridSal	12/1/2014 4:05 PM	File folder	
iFAB	12/1/2014 4:05 PM	File folder	
NewTool	12/4/2014 4:07 PM	File folder	
PYTHON_RICARDO	12/1/2014 4:05 PM	File folder	
QR	12/1/2014 4:05 PM	File folder	
SwRI	12/1/2014 4:05 PM	File folder	
add_registry_entries.py	10/21/2014 10:00 ...	Python File	2 KB
Readme.md	10/21/2014 10:02 ...	MD File	3 KB

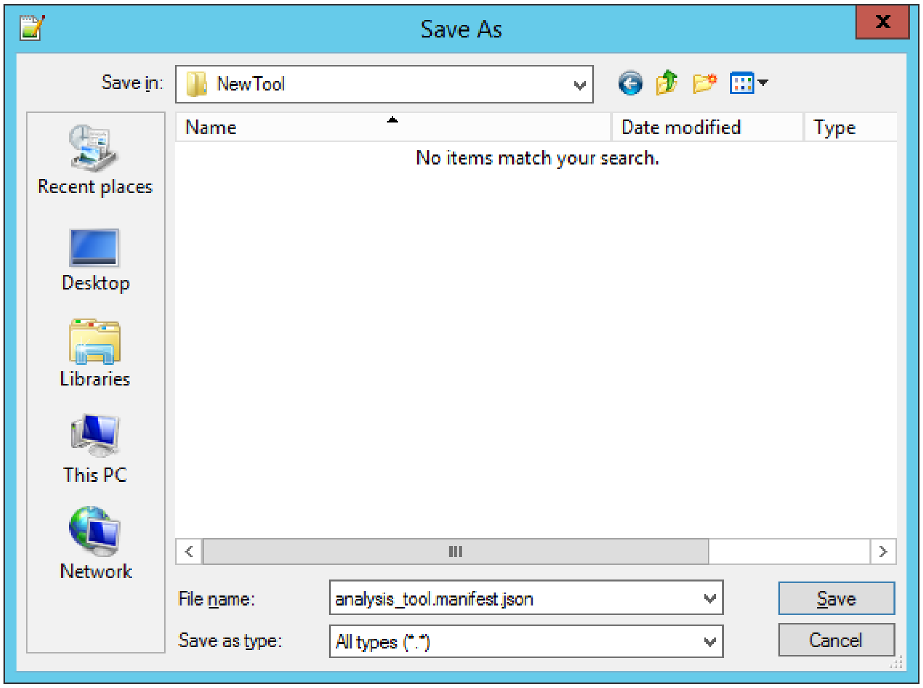
Figure 1: Location of new directory

2. Create `analysis_tool.manifest.json`

Add `analysis_tool.manifest.json` inside the created folder, see Figure 2. An example can be found at:

`META tool install location\analysis_tools\ExamplePython\analysis_tool.manifest.json`.

Note: one directory can contain multiple analysis tools.



Save in: NewTool

No items match your search.

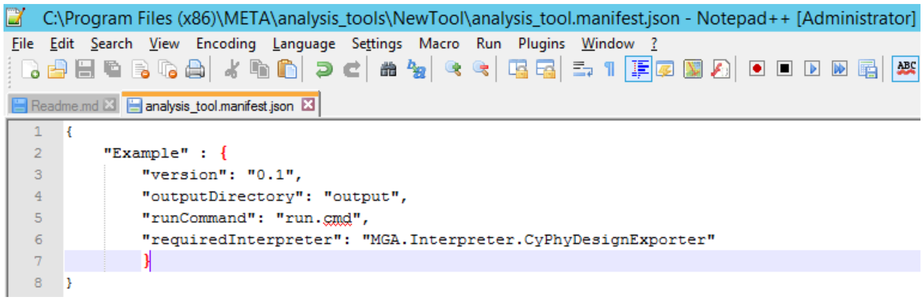
File name: analysis_tool.manifest.json

Save as type: All types (*.*)

Figure 2: Create new `analysis_tool.manifest.json`

3. Configure `analysis_tool.manifest.json`

Change the values accordingly to your needs in your `analysis_tool.manifest.json` file.


C:\Program Files (x86)\META\analysis_tools\NewTool\analysis_tool.manifest.json - Notepad++ [Administrator]
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
Readme.md
analysis_tool.manifest.json

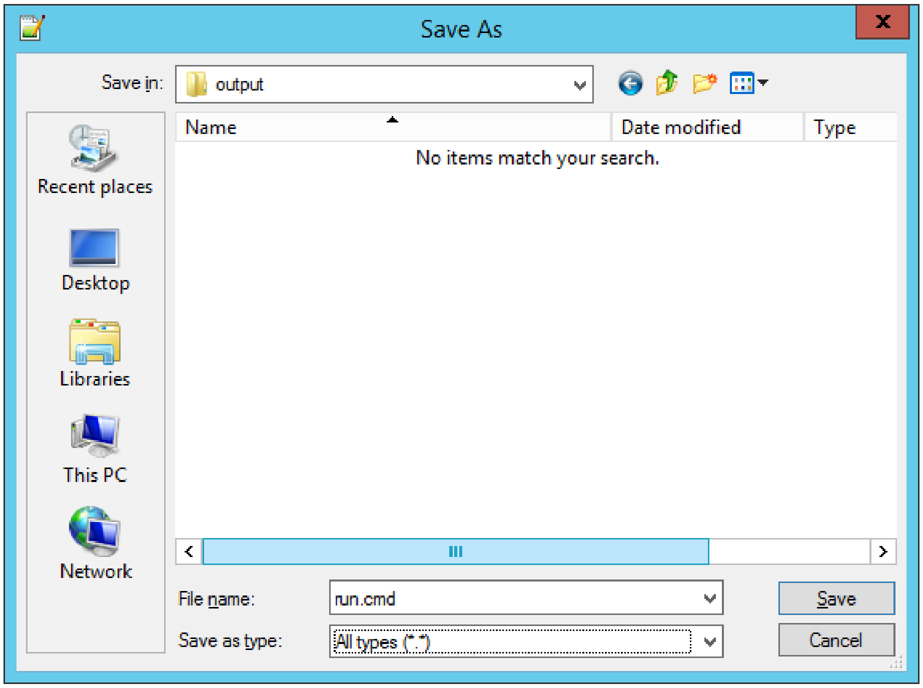
```
{
    "Example" : {
        "version": "0.1",
        "outputDirectory": "output",
        "runCommand": "run.cmd",
        "requiredInterpreter": "MGA.Interpreter.CyPhyDesignExporter"
        }
}
```

Figure 3: Configure `analysis_tool.manifest.json`

1. `key` - name of your tool
2. `version` - version number of your tool
3. `outputDirectory` - content of this directory will be copied to **every** test bench output directory where your tool is selected as the analysis tool. Note: this could override some generated artifacts, pick file names carefully.
4. `runCommand` - main entry point to your tool. It is *strongly* recommended that you use a batch file and then call python/java or other tools, see Figure 4 and 5. (For failed executions exit with error code != 0.)
5. `requiredInterpreter` - defines the ProgID of the interpreter that has to generate the input artifacts for your analysis tool. Examples

    1. `MGA.Interpreter.CyPhy2CAD_CSharp` - Generates input files for CAD processing (Assembly, FEA, CFD, Thermal, Kinematic, etc.)
    2. `MGA.Interpreter.CyPhyCADAnalysis` - Generates CAD files.
    3. `MGA.Interpreter.CyPhy2Modelica_v2` - Generates composed Modelica models.
    4. `MGA.Interpreter.CyPhyDesignExporter` - Generates an ADM (xml) file describing the design.

Note: For more than one analysis tool add an extra key-value pair.

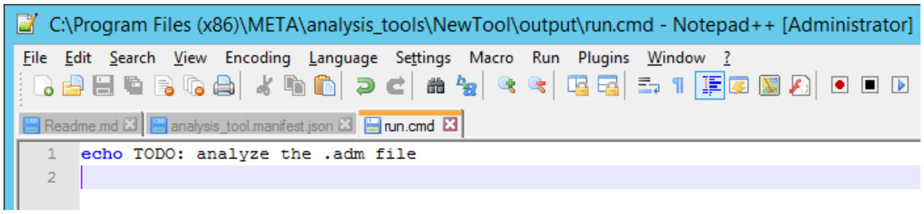


Save in: output

File name: run.cmd

Save as type: All types (*.*)

Figure 4: Create batch file for `runCommand`

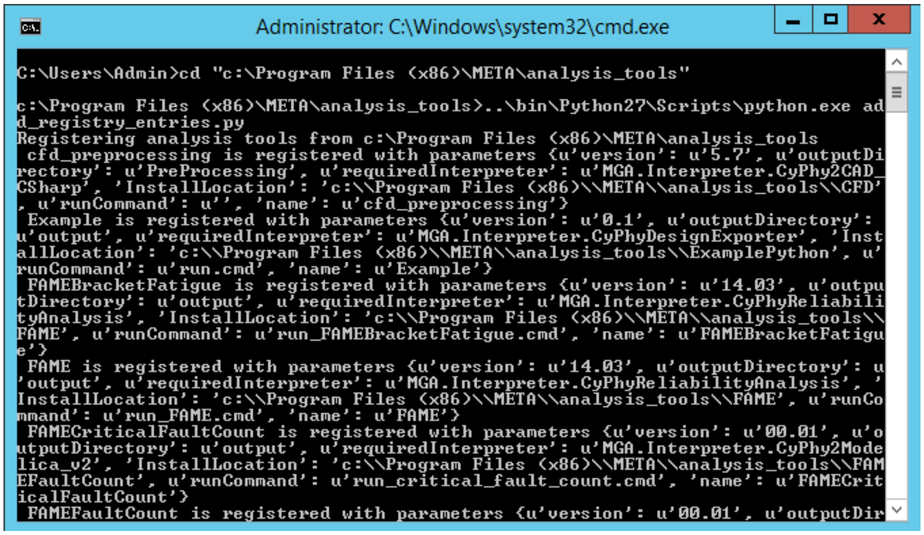

C:\Program Files (x86)\META\analysis_tools\NewTool\output\run.cmd - Notepad++ [Administrator]
File
Edit
Search
View
Encoding
Language
Settings
Macro
Run
Plugins
Window
?
Readme.md
analysis_tool.manifest.json
run.cmd

```
echo TODO: analyze the .adm file

```

Figure 5: Batch file for `runCommand`

4. Register tools

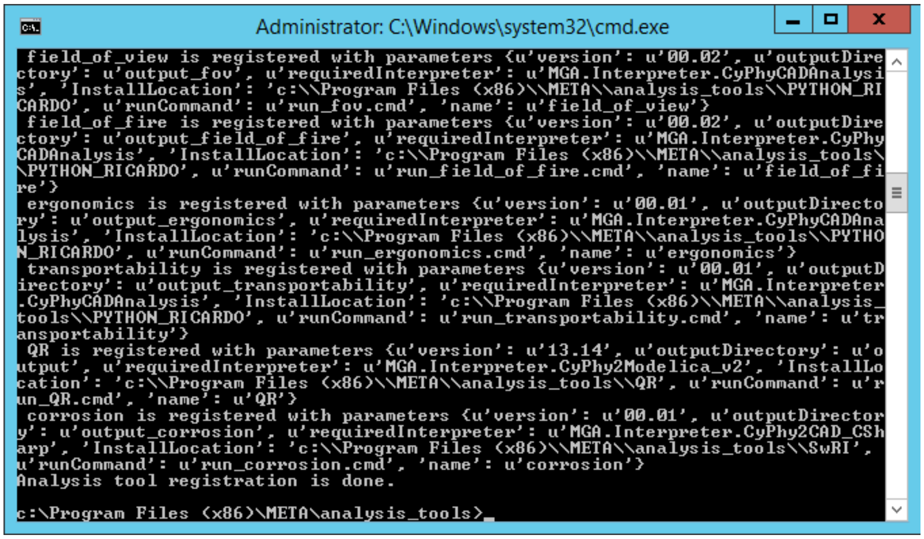
Register all tools by running the `add_registry_entries.py` script from the META Python virtual environment as an administrator: `..\bin\Python27\Scripts\python.exe add_registry_entries.py`.



```
C:\Users\Admin>cd "c:\Program Files (x86)\META\analysis_tools"

c:\Program Files (x86)\META\analysis_tools>..\bin\Python27\Scripts\python.exe ad
d_registry_entries.py
Registering analysis tools from c:\Program Files (x86)\META\analysis_tools
 cfd_preprocessing is registered with parameters {u'version': u'5.7', u'outputDi
rectory': u'PreProcessing', u'requiredInterpreter': u'MGA.Interpreter.CyPhy2CAD_
CSharp', 'InstallLocation': 'c:\\Program Files (x86)\\META\\analysis_tools\\CFD'
, u'runCommand': u'', 'name': u'cfd_preprocessing'}
 Example is registered with parameters {u'version': u'0.1', u'outputDirectory':
u'output', u'requiredInterpreter': u'MGA.Interpreter.CyPhyDesignExporter', 'Inst
allLocation': 'c:\\Program Files (x86)\\META\\analysis_tools\\ExamplePython', u'
runCommand': u'run.cmd', 'name': u'Example'}
 FAMEBracketFatigue is registered with parameters {u'version': u'14.03', u'outpu
tDirectory': u'output', u'requiredInterpreter': u'MGA.Interpreter.CyPhyReliabili
tyAnalysis', 'InstallLocation': 'c:\\Program Files (x86)\\META\\analysis_tools\\
FAME', u'runCommand': u'run_FAMEBracketFatigue.cmd', 'name': u'FAMEBracketFatigu
e'}
 FAME is registered with parameters {u'version': u'14.03', u'outputDirectory': u
'output', u'requiredInterpreter': u'MGA.Interpreter.CyPhyReliabilityAnalysis', '
InstallLocation': 'c:\\Program Files (x86)\\META\\analysis_tools\\FAME', u'runCo
mmand': u'run_FAME.cmd', 'name': u'FAME'}
 FAMECriticalFaultCount is registered with parameters {u'version': u'00.01', u'o
utputDirectory': u'output', u'requiredInterpreter': u'MGA.Interpreter.CyPhy2Mode
lica_v2', 'InstallLocation': 'c:\\Program Files (x86)\\META\\analysis_tools\\FAM
EFaultCount', u'runCommand': u'run_critical_fault_count.cmd', 'name': u'FAMECrit
icalFaultCount'}
 FAMEFaultCount is registered with parameters {u'version': u'00.01', u'outputDir
```

Figure 6: Start registration

If it runs successfully then `Analysis tool registration is done.` is the last message in the console.



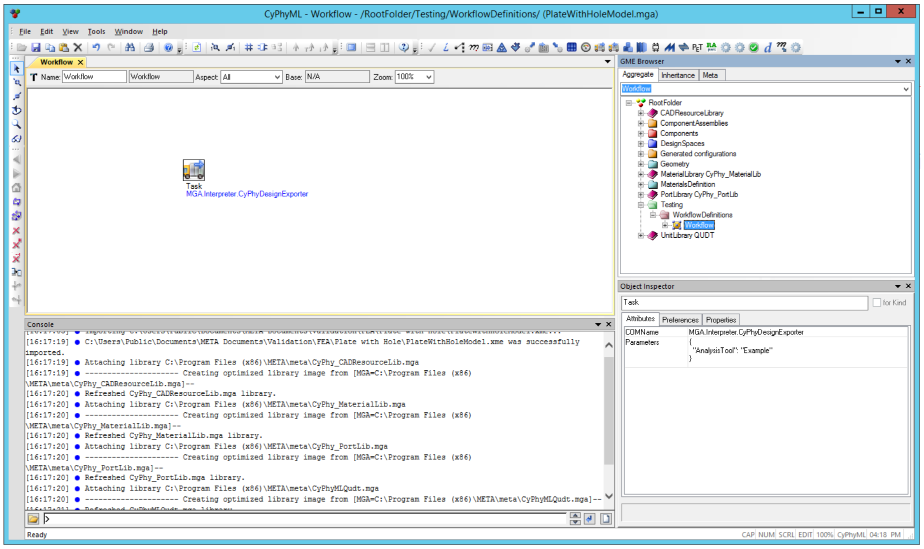
```
 field_of_view is registered with parameters {u'version': u'00.02', u'outputDire
ctory': u'output_fov', u'requiredInterpreter': u'MGA.Interpreter.CyPhyCADAnalysi
s', 'InstallLocation': 'c:\\Program Files (x86)\\META\\analysis_tools\\PYTHON_RI
CARDO', u'runCommand': u'run_fov.cmd', 'name': u'field_of_view'}
 field_of_fire is registered with parameters {u'version': u'00.02', u'outputDire
ctory': u'output_field_of_fire', u'requiredInterpreter': u'MGA.Interpreter.CyPhy
CADAnalysis', 'InstallLocation': 'c:\\Program Files (x86)\\META\\analysis_tools\
\PYTHON_RICARDO', u'runCommand': u'run_field_of_fire.cmd', 'name': u'field_of_fi
re'}
 ergonomics is registered with parameters {u'version': u'00.01', u'outputDirecto
ry': u'output_ergonomics', u'requiredInterpreter': u'MGA.Interpreter.CyPhyCADAna
lysis', 'InstallLocation': 'c:\\Program Files (x86)\\META\\analysis_tools\\PYTHO
N_RICARDO', u'runCommand': u'run_ergonomics.cmd', 'name': u'ergonomics'}
 transportability is registered with parameters {u'version': u'00.01', u'outputD
irectory': u'output_transportability', u'requiredInterpreter': u'MGA.Interpreter
.CyPhyCADAnalysis', 'InstallLocation': 'c:\\Program Files (x86)\\META\\analysis_
tools\\PYTHON_RICARDO', u'runCommand': u'run_transportability.cmd', 'name': u'tr
ansportability'}
 QR is registered with parameters {u'version': u'13.14', u'outputDirectory': u'o
utput', u'requiredInterpreter': u'MGA.Interpreter.CyPhy2Modelica_v2', 'InstallLo
cation': 'c:\\Program Files (x86)\\META\\analysis_tools\\QR', u'runCommand': u'r
un_QR.cmd', 'name': u'QR'}
 corrosion is registered with parameters {u'version': u'00.01', u'outputDirector
y': u'output_corrosion', u'requiredInterpreter': u'MGA.Interpreter.CyPhy2CAD_CSh
arp', 'InstallLocation': 'c:\\Program Files (x86)\\META\\analysis_tools\\SwRI',
u'runCommand': u'run_corrosion.cmd', 'name': u'corrosion'}
Analysis tool registration is done.

c:\Program Files (x86)\META\analysis_tools>_
```

Figure 7: Successful registration

5. Reference analysis tool from CyPhy (GME)

Create a `Workflow`, see Figure 8. Add `Task` and select the interpreter (as defined by `requiredInterpreter`), see Figure 9.

Double click on the `Task` object in the `Workflow` definition and select your tool from the drop down list, see Figure 10.



CyPhyML - Workflow - /RootFolder/Testing/WorkflowDefinitions/ (PlateWithHoleModel.mga)

Name: Workflow | Workflow | Aspect: All | Base: N/A | Zoom: 100%

Task
MGA.Interpreter.CyPhyDesignExporter

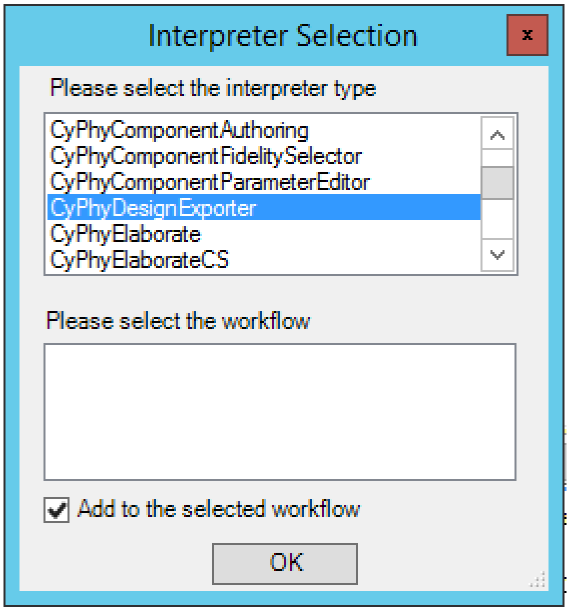
Task

COMName	MGA.Interpreter.CyPhyDesignExporter

Parameters	{
	"AnalysisTool": "Example"
	}

```
[16:17:19] ● C:\Users\Public\Documents\META Documents\Validation\FEA\Plate with Hole\PlateWithHoleModel.xme was successfully
imported.
[16:17:19] ● Attaching library C:\Program Files (x86)\META\meta\CyPhy_CADResourceLib.mga
[16:17:19] ● -------------------- Creating optimized library image from [MGA=C:\Program Files (x86)
\META\meta\CyPhy_CADResourceLib.mga]--
[16:17:20] ● Refreshed CyPhy_CADResourceLib.mga library.
[16:17:20] ● Attaching library C:\Program Files (x86)\META\meta\CyPhy_MaterialLib.mga
[16:17:20] ● -------------------- Creating optimized library image from [MGA=C:\Program Files (x86)
\META\meta\CyPhy_MaterialLib.mga]--
[16:17:20] ● Refreshed CyPhy_MaterialLib.mga library.
[16:17:20] ● Attaching library C:\Program Files (x86)\META\meta\CyPhy_PortLib.mga
[16:17:20] ● -------------------- Creating optimized library image from [MGA=C:\Program Files (x86)
\META\meta\CyPhy_PortLib.mga]--
[16:17:20] ● Refreshed CyPhy_PortLib.mga library.
[16:17:20] ● Attaching library C:\Program Files (x86)\META\meta\CyPhyMLQudt.mga
[16:17:20] ● -------------------- Creating optimized library image from [MGA=C:\Program Files (x86)\META\meta\CyPhyMLQudt.mga]--
```

Figure 8: Create Workflow and Task



Interpreter Selection

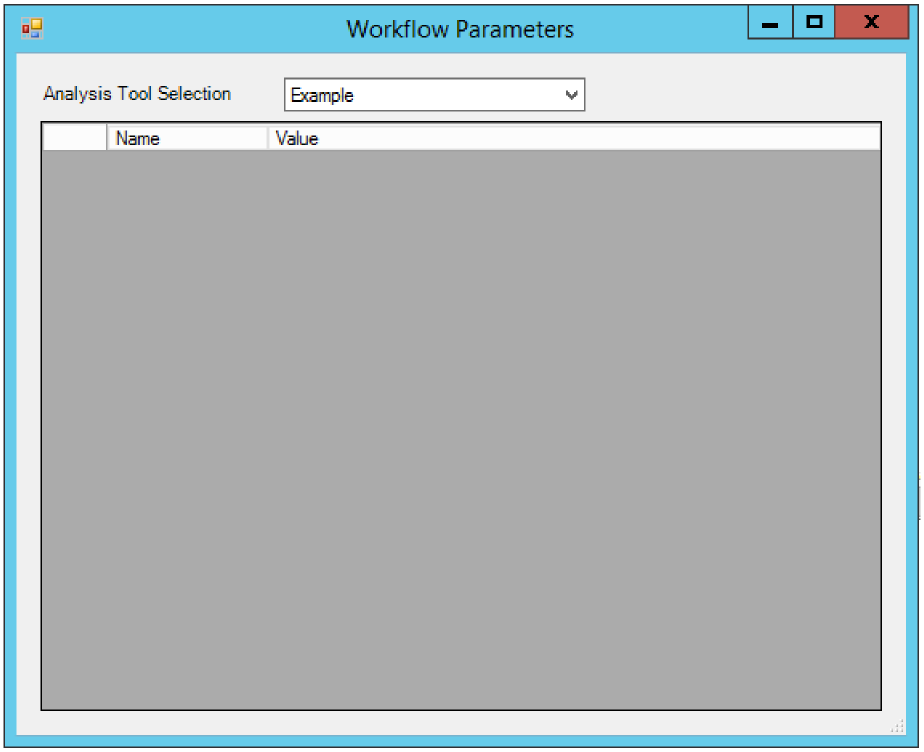
Please select the interpreter type

- CyPhyComponentAuthoring
- CyPhyComponentFidelitySelector
- CyPhyComponentParameterEditor
- CyPhyDesignExporter
- CyPhyElaborate
- CyPhyElaborateCS

Please select the workflow

☑ Add to the selected workflow

Figure 9: Selected Interpreter for Task



Analysis Tool Selection: Example

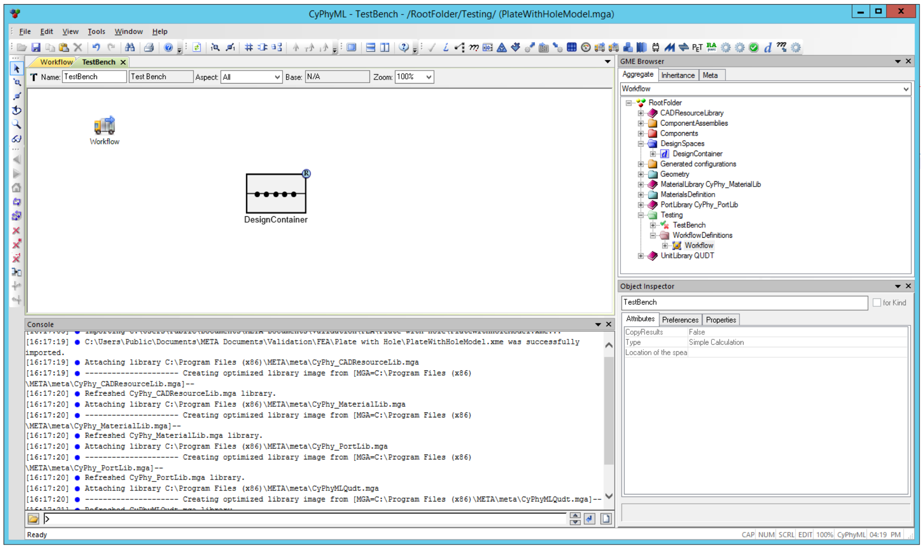
Figure 10: Set Analysis Tool for Task

6. Executing Test Bench

Create a reference to the `Workflow` from a `Test Bench`, see Figure 11.

Run the test bench using the `MasterInterpreter` and the `JobManager` configured for local execution, see Figure 12 and 13.

While existing with error code 0 the result will be reported as `Succeeded`, see Figure 14.



CyPhyML - TestBench - /RootFolder/Testing/ (PlateWithHoleModel.mga)

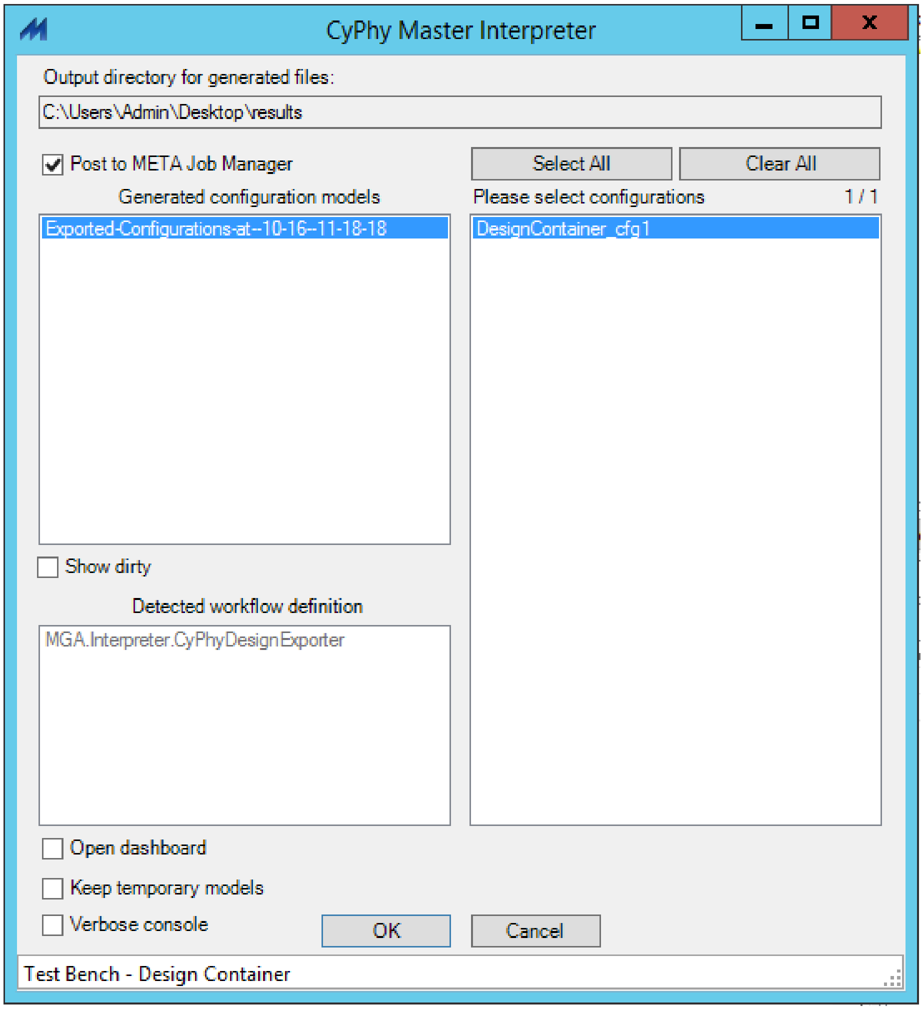
Name: TestBench | Test Bench | Aspect: All | Base: N/A | Zoom: 100%

```
[16:17:19] ● C:\Users\Public\Documents\META Documents\Validation\FEA\Plate with Hole\PlateWithHoleModel.xme was successfully
imported.
[16:17:19] ● Attaching library C:\Program Files (x86)\META\meta\CyPhy_CADResourceLib.mga
[16:17:19] ● -------------------- Creating optimized library image from [MGA=C:\Program Files (x86)
\META\meta\CyPhy_CADResourceLib.mga]--
[16:17:20] ● Refreshed CyPhy_CADResourceLib.mga library.
[16:17:20] ● Attaching library C:\Program Files (x86)\META\meta\CyPhy_MaterialLib.mga
[16:17:20] ● -------------------- Creating optimized library image from [MGA=C:\Program Files (x86)
\META\meta\CyPhy_MaterialLib.mga]--
[16:17:20] ● Refreshed CyPhy_MaterialLib.mga library.
[16:17:20] ● Attaching library C:\Program Files (x86)\META\meta\CyPhy_PortLib.mga
[16:17:20] ● -------------------- Creating optimized library image from [MGA=C:\Program Files (x86)
\META\meta\CyPhy_PortLib.mga]--
[16:17:20] ● Refreshed CyPhy_PortLib.mga library.
[16:17:20] ● Attaching library C:\Program Files (x86)\META\meta\CyPhyMLQudt.mga
[16:17:20] ● -------------------- Creating optimized library image from [MGA=C:\Program Files (x86)\META\meta\CyPhyMLQudt.mga]--
```

Object Inspector: TestBench □ for Kind

CopyResults	False
Type	Simple Calculation
Location of the spea	

Figure 11: Reference Workflow from Test Bench



Output directory for generated files: C:\Users\Admin\Desktop\results

☑ Post to META Job Manager

Generated configuration models: Exported-Configurations-at--10-16--11-18-18

Please select configurations 1 / 1: DesignContainer_cfg1

□ Show dirty

Detected workflow definition: MGA.Interpreter.CyPhyDesignExporter

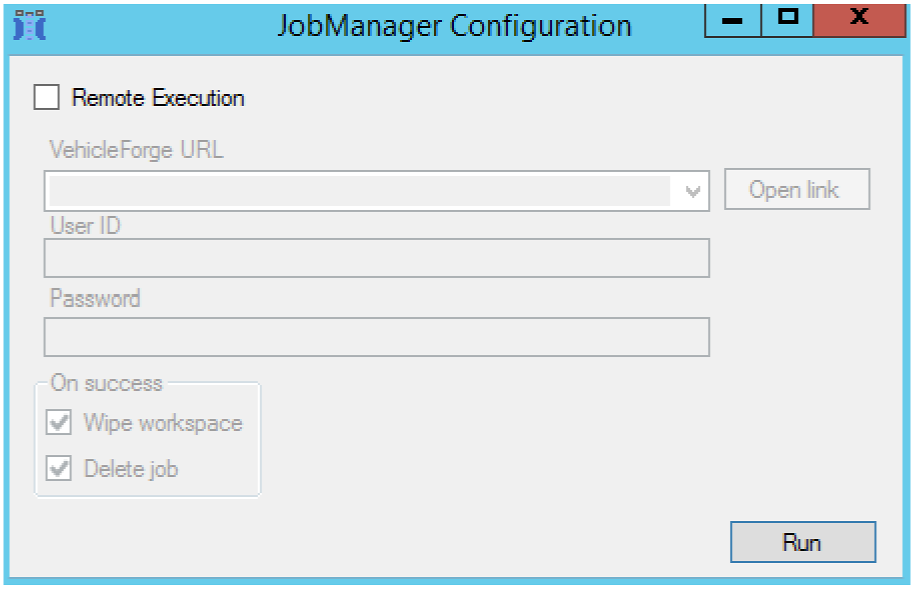
□ Open dashboard

□ Keep temporary models

□ Verbose console

Test Bench - Design Container

Figure 12: MasterInterpreter Dialog



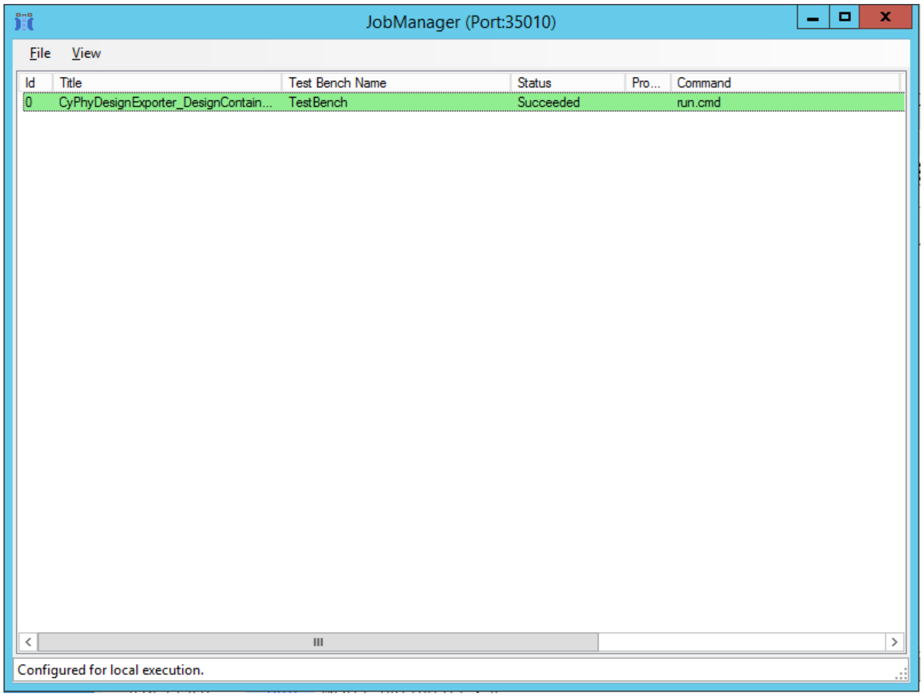
☐ Remote Execution

On success

☑ Wipe workspace

☑ Delete job

Figure 13: JobManager Dialog



Id	Title	Test Bench Name	Status	Pro...	Command
0	CyPhyDesignExporter_DesignContain...	TestBench	Succeeded		run.cmd

Configured for local execution.

Figure 14: JobManager Job Status