

IGNITE 2017.1 New Features



What is IGNITE?



IGNITE is a multi-domain system modelling and simulation software which includes modelling libraries suitable for various automotive applications such as drive cycle, performance and thermal system analysis.

- The diverse range of modelling libraries are also equally applicable for system analyses in a wide variety of different industrial sectors; this might include Off-Highway, Rail, Defense and Water distribution.
- Platform flexibility allows for effective utilization from early vehicle concept analysis to detailed design phases



Comprehensive

Flexible

Built-in decision support

Speed

IGNITE is a Modelica-based environment for the modeling and simulation of complex physics-based systems



**Complete Complex
System Modeling**

**Thermal System
Modeling**

**Duty Cycle
Simulation**



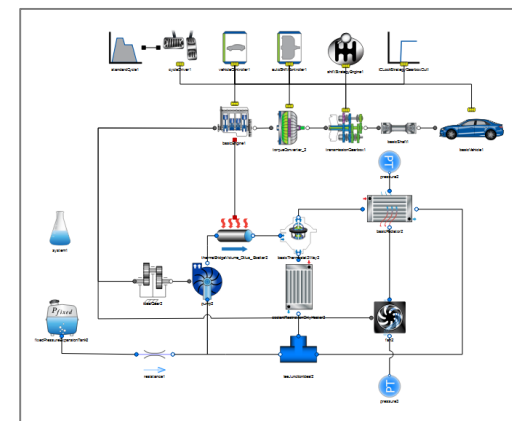
**Energy Flow
Analysis**



**Performance &
Fuel Economy
Prediction**

**Powertrain /
Systems
Integration**

**Hybrid System
Design**

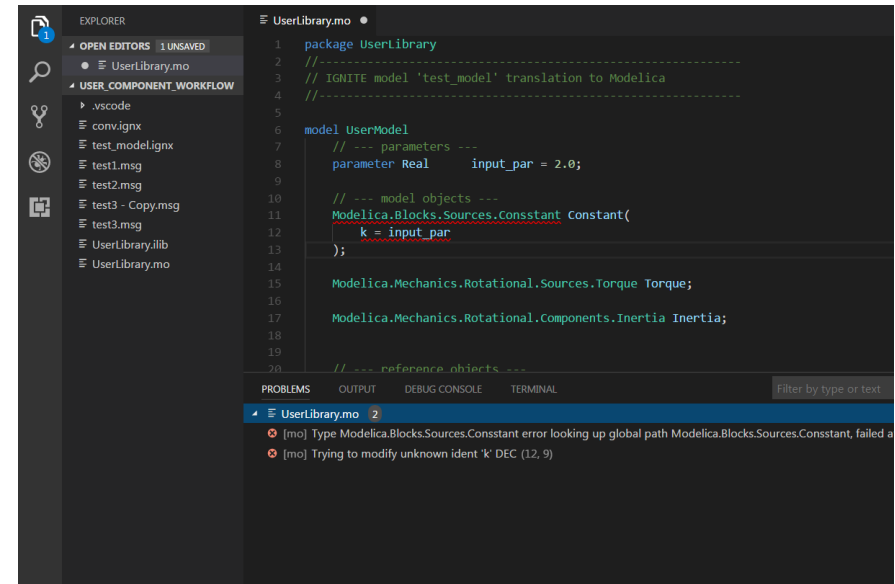


Modelica Editor

usability and capability



- Full Modelica 3.3 grammar support
- Syntax highlighting
- Code completion of all loaded packages
- Syntax and semantic error checking
- Corrections suggestions
- Standalone Ricardo Software App
- Code outline for easier navigation
- Based on Visual Studio Code
- Easy installation; IT admin privileges not required
- Automatic library import/update to IGNITE

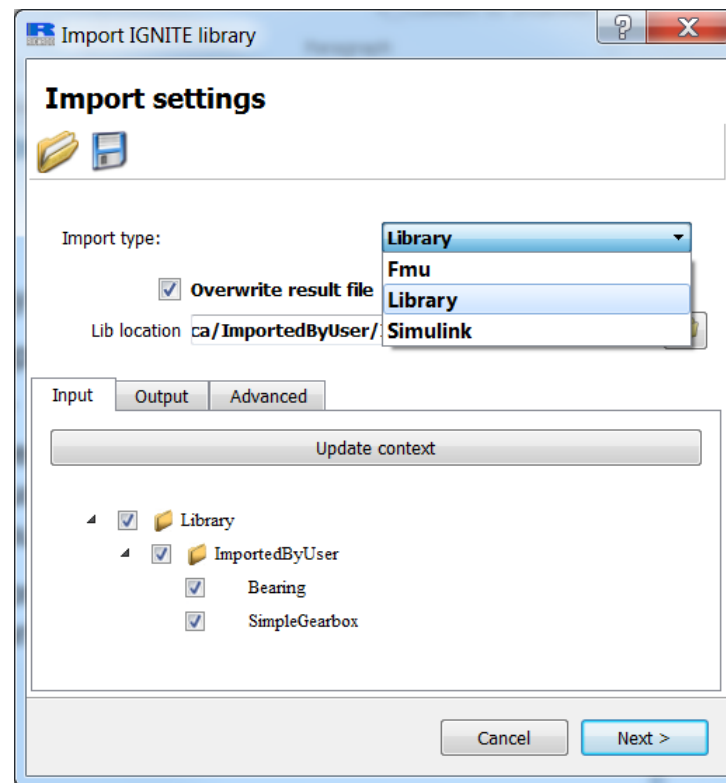
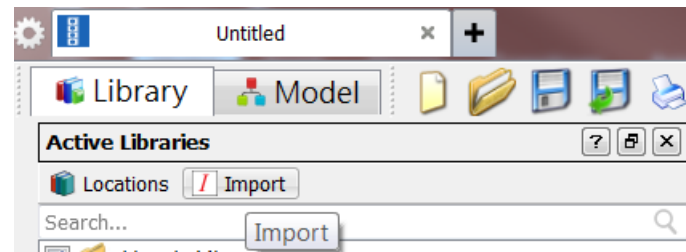


User Library Import

usability and flexibility



- Integrated interface easy to operate
- Support for Modelica, FMU and Simulink DLL
- Save/load the import configurations filtering only desired inputs and outputs (especially useful with FMUs)
- Automatic updates pushed/overwritten for already existing libraries

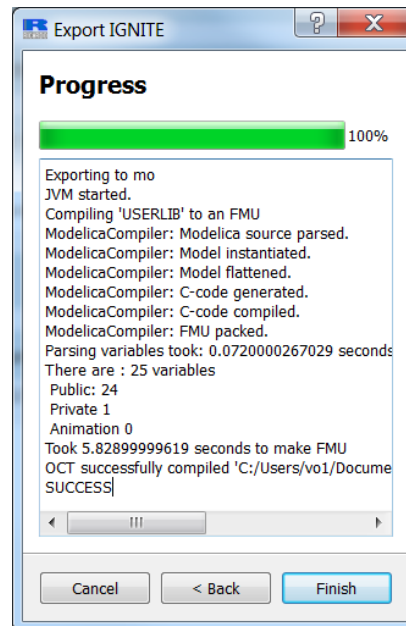
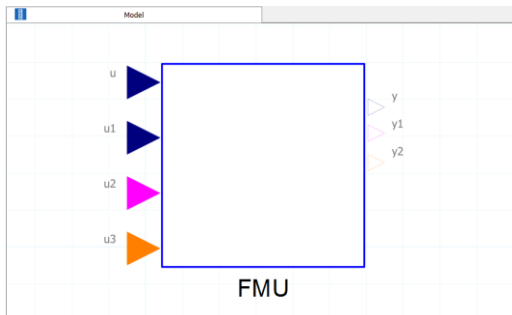
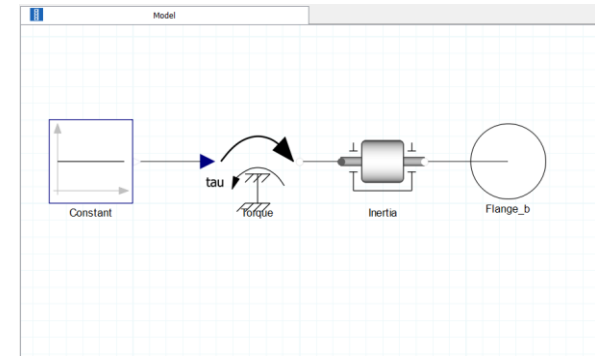


Generating Modelica code and FMU from the IGNITE model

flexibility



- Modelica code generation into user-defined packages based on the model canvas graphical representation
- FMU generation with the different export options (32 or 64 bit, Co-Simulation vs Model Exchange, 1.0 or 2.0)
- Offers rich options for advanced users to customize the components built on existing libraries



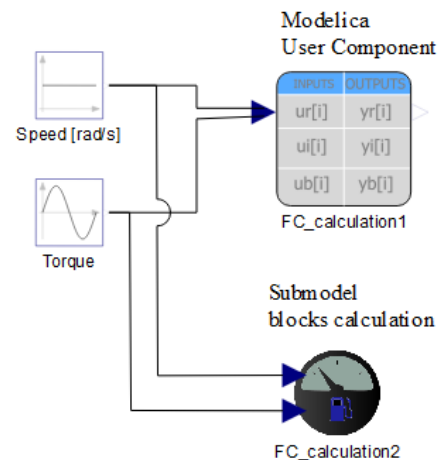
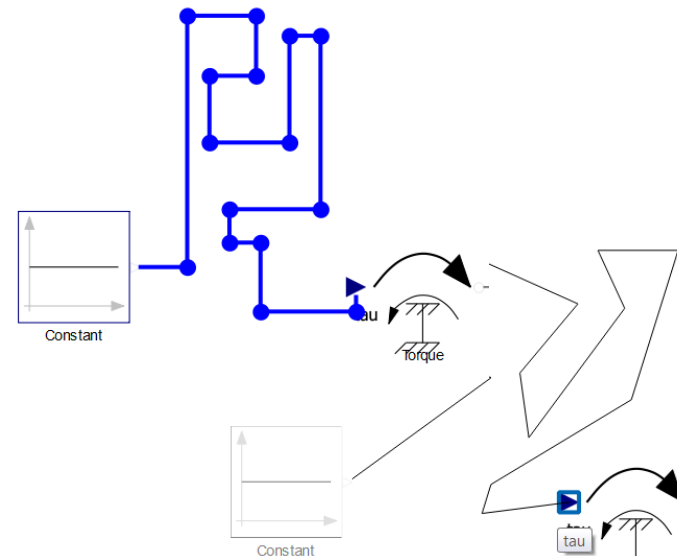
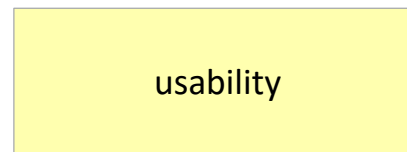
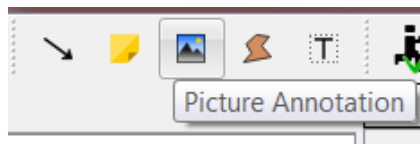
```

UserLibrary.mo
1 package UserLibrary
2 //-----
3 // IGNITE model 'test_model' translation to Modelica
4 //-----
5
6 model UserModel
7   // --- parameters ---
8   parameter Real    input_par = 2.0;
9
10  // --- model objects ---
11  Modelica.Blocks.Sources.Constant Constant(
12    k = input_par
13  );
14
15  Modelica.Mechanics.Rotational.Sources.Torque Torque;
16
17  Modelica.Mechanics.Rotational.Components.Inertia Inertia;
18
19
20  // --- reference objects ---
21

```

Canvas Enhancements

- Free and orthogonal routing and connector snapping
- Model annotations
 - Text
 - Notes
 - Pictures
 - Polygons
 - Arrows markup
 - Transparency and layers supported
 - Easy access from the toolbar



Alternative methods
to obtain the same results

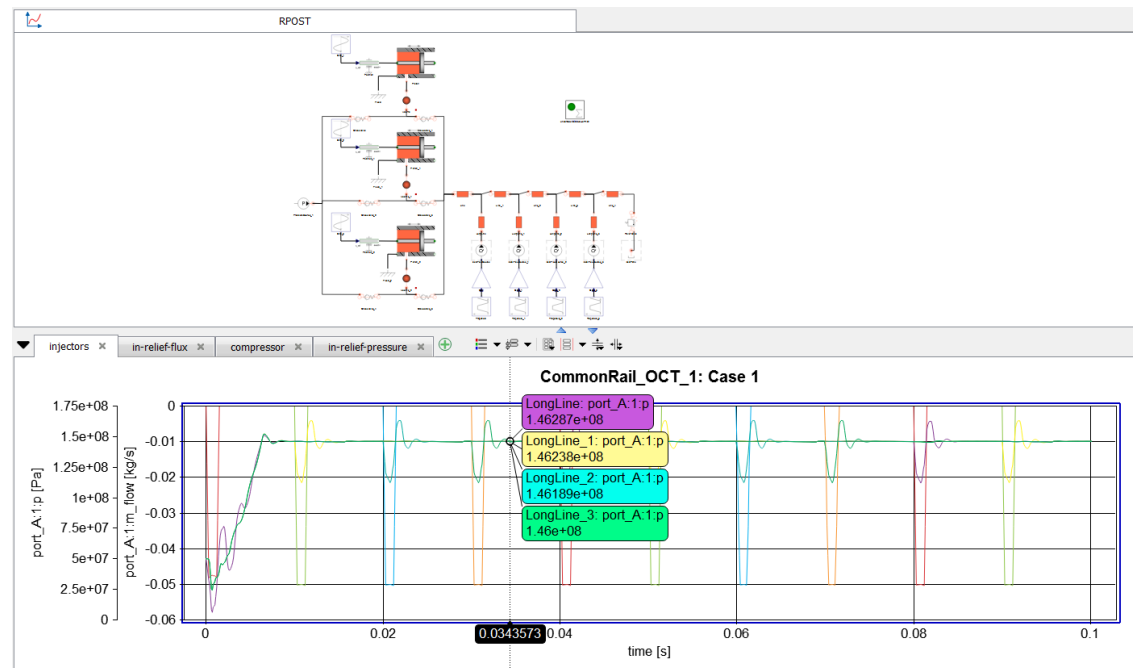
Modelon Libraries

flexibility and capability



- Support for 7 Modelon libraries
- Allows for large cross-domain applications
- Upgrade process based on Modelica conversion standard
- Modelica translation enhancements
- Examples in IGNITE

- ▶ Modelon Base Library
- ▶ Modelon Fuel Cell Library
- ▶ Modelon Heat Exchanger Library
- ▶ Modelon Hydraulics Library
- ▶ Modelon Liquid Cooling Library
- ▶ Modelon Pneumatics Library
- ▶ Modelon Vapor Cycle Library

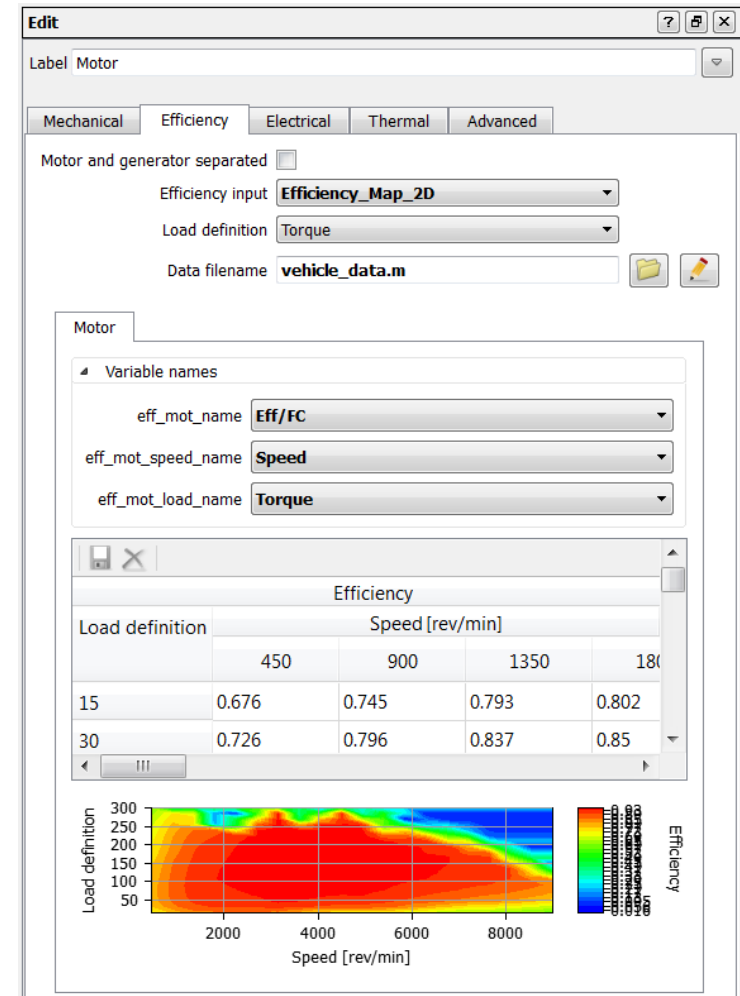


External Data via Table/Graph Widgets

usability



- Input data visualization for data inspections
- Linked to the external files independent of the model
- Tables are editable and edits writable into the linked files
- Reading the files will detect the variable names for the user-made selections
- Currently supports most of the relevant Powertrain and Standard library components
- Automatic widgets translation using the custom Modelica annotation into IGNITE

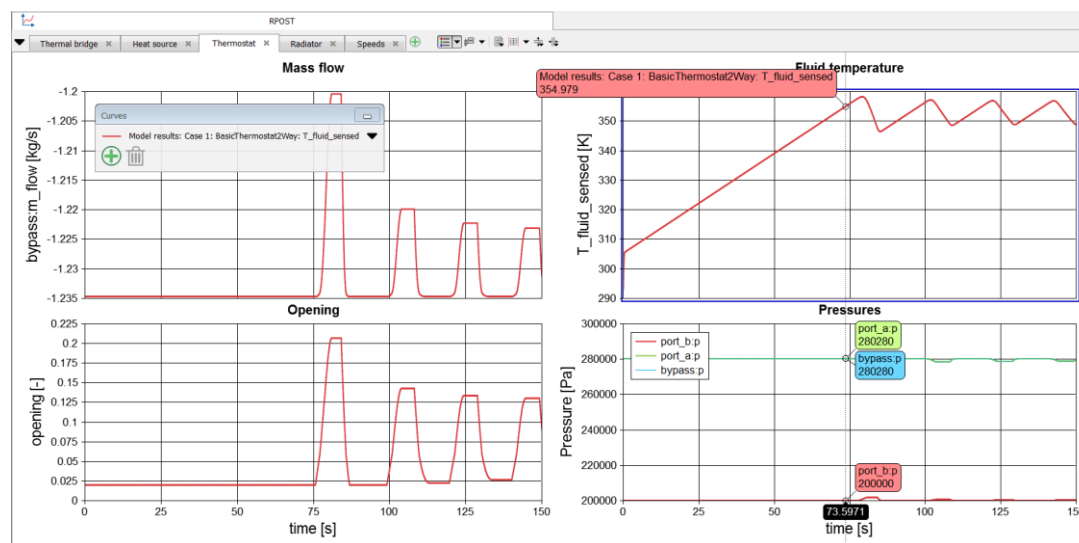
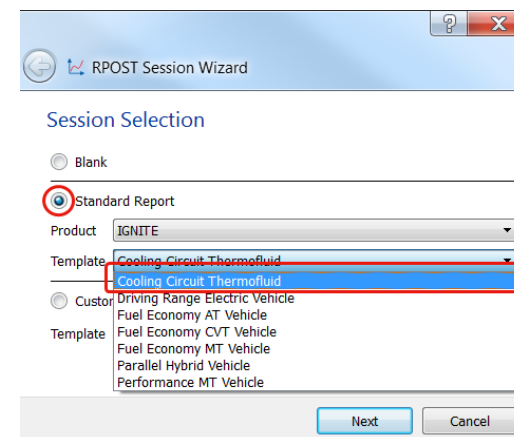


RPOST - a brand new R-Desk postprocessing

usability and flexibility



- Standard and user defined templates
- Result data versioning
- Wizard matching the templates and models content
- Currently ASCII and IGNITE data source support
- Easy cross-plotting data and elements content
- Linked with IGNITE model
- Subplots and multiple axles with different tooltip display modes

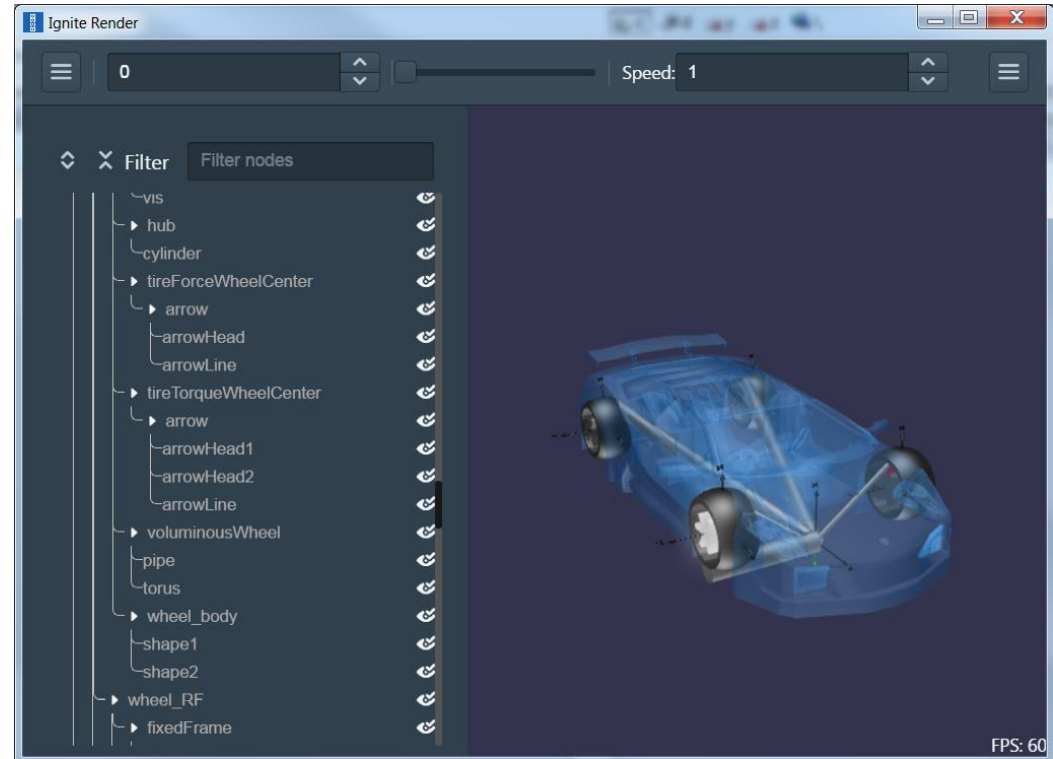


3D Visualization Application

usability and flexibility



- Suitable for Modelica Multibody based 3D modeling
- External CAD shapes support
- IGNITE Standard package
- Animation and appearance controls
- Automatically generating the required input files by listening to running IGNITE solutions
- Web technology based solution





- Parameters tied together or full factorial
- 2-level and 3-level full factorial supported
- Fast simulation times as often no recompilation is required
- Input form validation

The screenshot shows the 'Parametric Case Definition_1' dialog box. The 'Model' tab is active. The 'Editable' dropdown is set to 'Editable'. The 'Sweep' button is highlighted. The 'Search...' field is empty. The 'Generate cases automatically' checkbox is checked. The table below lists the cases:

	Name	Type	Units	Group	Comment	Case 1	
Case Title						Case 1	
Enabled						☒	
X	X	Real					
Y	Y	Real					
Z	Z	Real					

Sweep Parameter

Settings

Sweep mode: **Full factorial**

Insertion mode: ☒ Replace selected cases ☐ Append cases

Parameters Sweep

Parameter **X**

From: 0 To: 50

☒ Cases: 5 ☐ Step: 0

Parameter **Y**

From: 0 To: 10

☒ Cases: 2 ☐ Step: 0

Parameter **Z**

From: 0 To: 100

☒ Cases: 4 ☐ Step: 10

Preview

Total number of cases: 40

	X	Y
Step	12.5	10
1	0	0
2	12.5	0
3	25	0
4	37.5	0
5	50	0
6	0	10
7	12.5	10
8	25	10
9	37.5	10
10	50	10
11	0	0

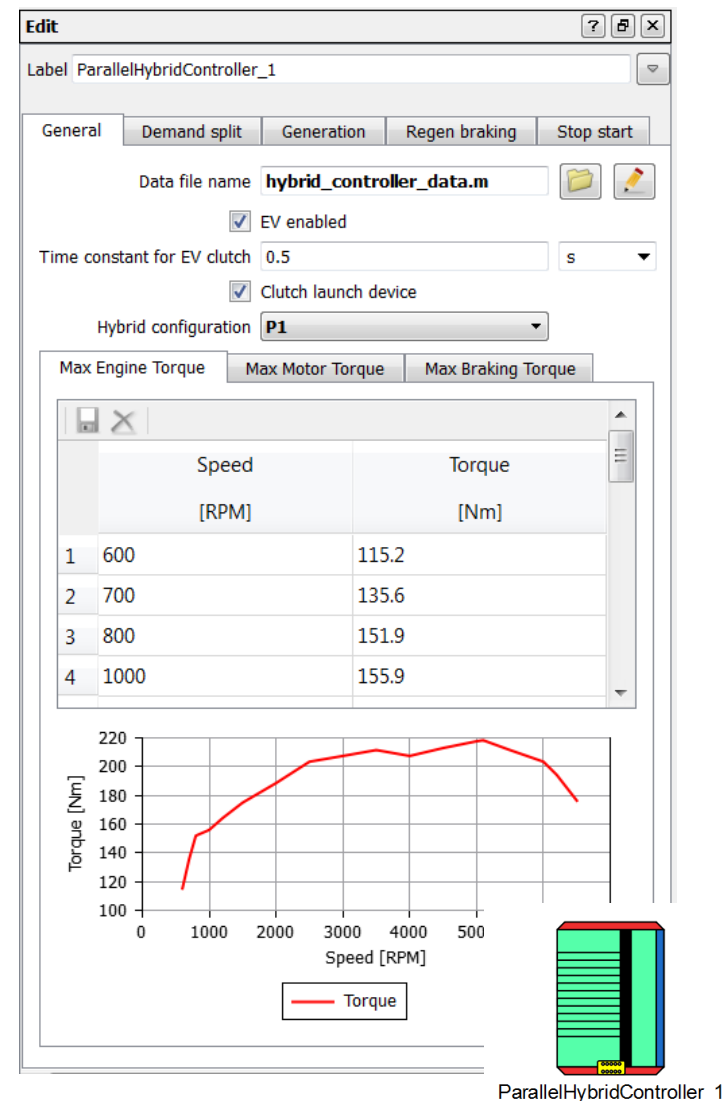
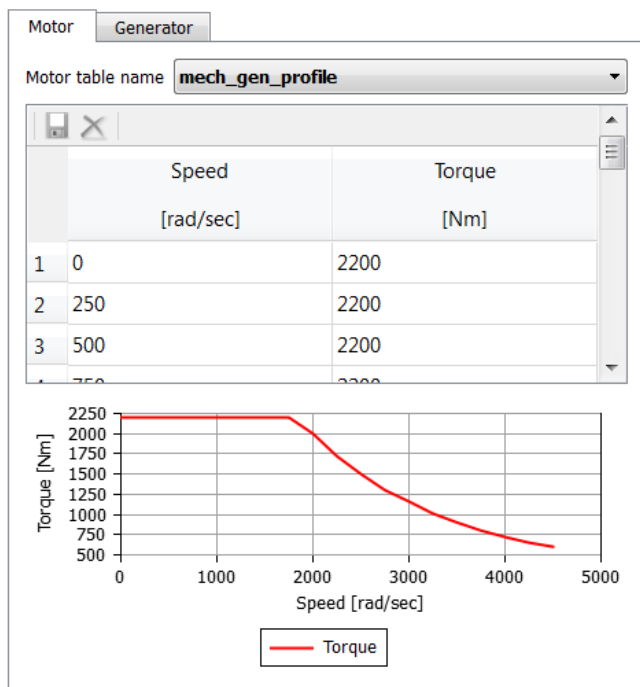
OK Cancel

Powertrain Library Enhancements

usability and capability



- Modular Parallel Hybrid Controller for P1-P3 architectures
- MotorGenerator mechanical specifications by the external file providing the individual points

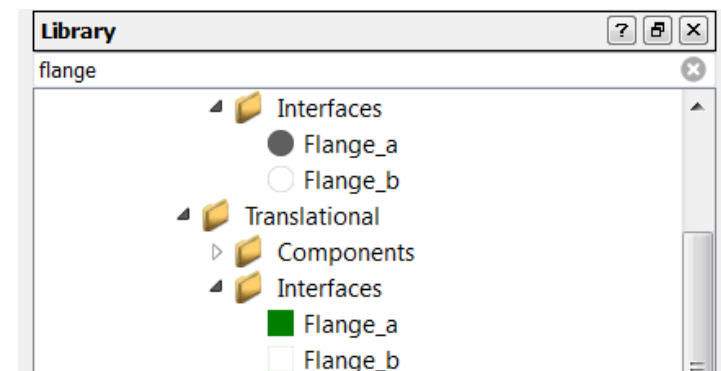
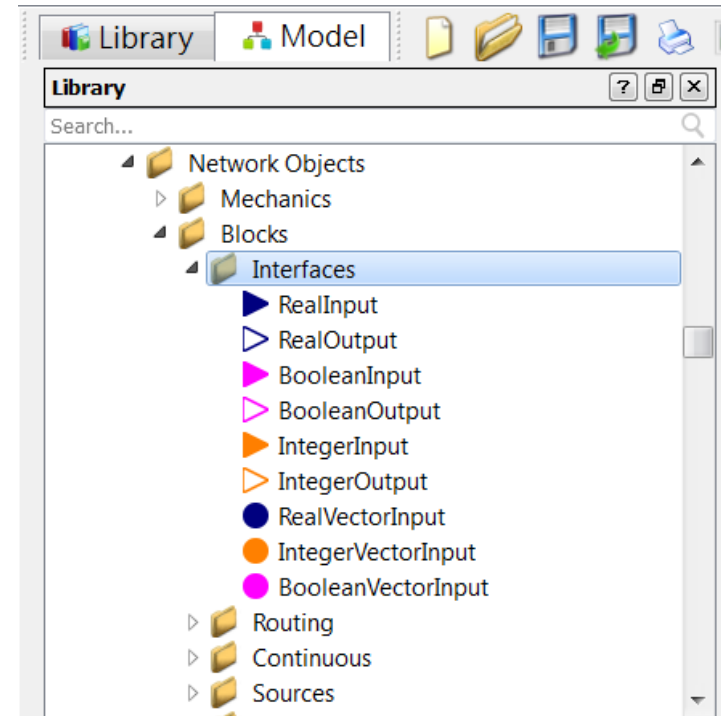
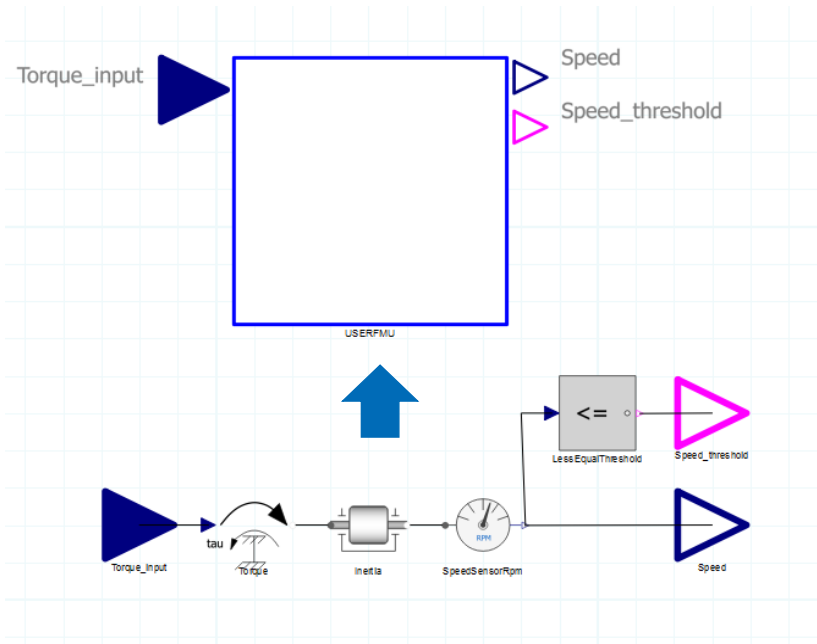


Modelica Interfaces

usability and flexibility



- Modelica Standard Interfaces supported
 - Real, Integer, Boolean
 - Inputs and Outputs
 - Domain connectors (not for FMU export)
- Easy to export FMU

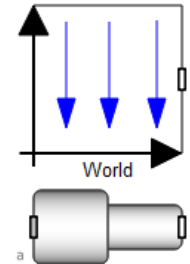


Vehicle Dynamics Approach in IGNITE

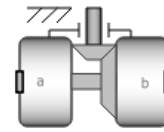
capability



- IMoved Library - Modelica based VD solution
- Based on MSL - Modelica.Mechanics.Multibody
- Complete 3D Environment
- Weather and Road profile
- Vehicle Chassis Subcomponents
 - Anti-roll Bar
 - MacPherson
 - Ackerman Steering
 - Trailing Arm
 - Various Types of Differentials
- Tires
 - TMeasy or MF Tire - Pac2002
- Path Driver
- Prepopulated Example Models
- Strong benefit from 3D visualization Application



Cylindrical



Revolute



Prismatic

