



2018 IDAJ为中国新能源汽车加速
整车 / 新能源汽车关键性仿真技术

无人驾驶 | 新能源整车EMC | 动力性及能量管理 | 动力锂电池 | 结构可靠性

武汉 | 重庆 | 上海 | 广州 | 北京 | 长春巡回研讨会



IDAJ公司

GT-DRIVE+ 新能源车动力性解决方案

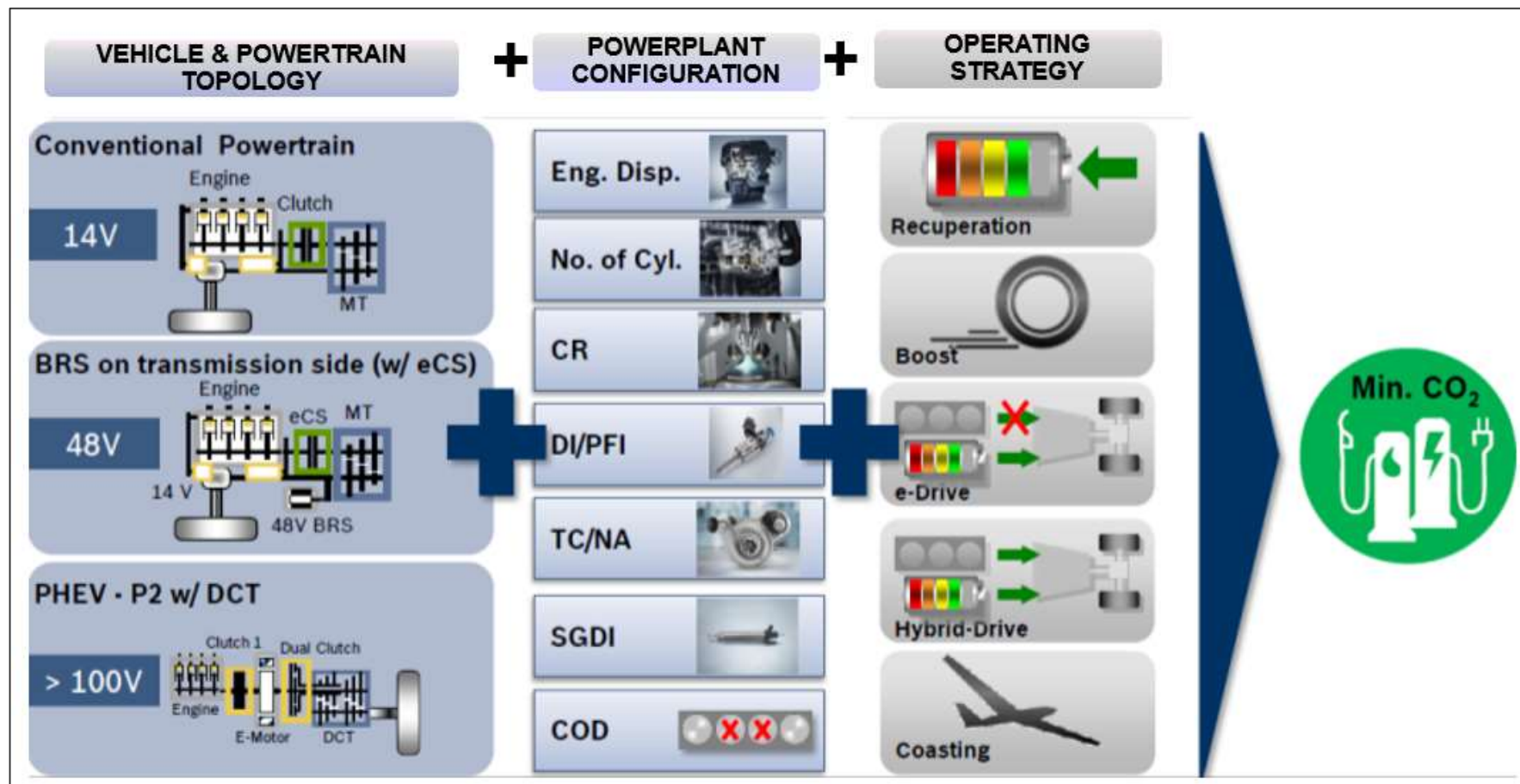
IDAJ中国
新能源小组

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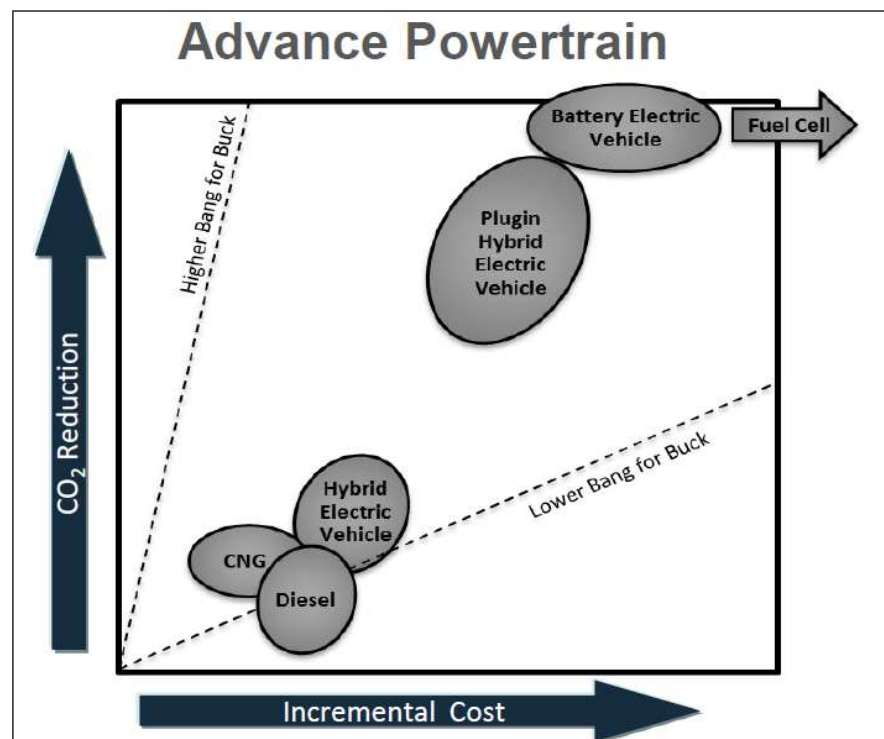
越来越复杂的汽车系统

GT-SUITE 是虚拟评估先进车辆系统的理想平台

Source: 2013 GT
User Conference
Jens Tophoven
Robert Bosch



不同的应用场合有着不同的技术规范 and 法规

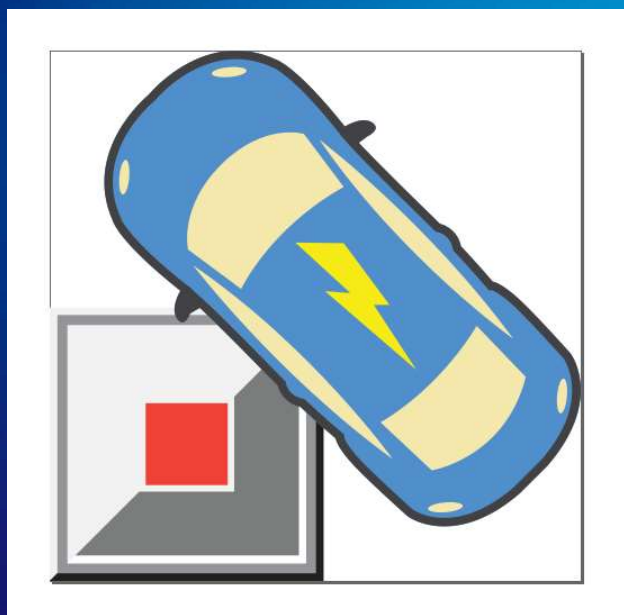


Source: 2016 CTI Symposium Presentation
Bob Lee, Head of Global Powertrain Coordination, FCA



Source: 2015 Modegat Conference
T. Auckenthaler, FPT Industrial

什么是GT-DRIVE+



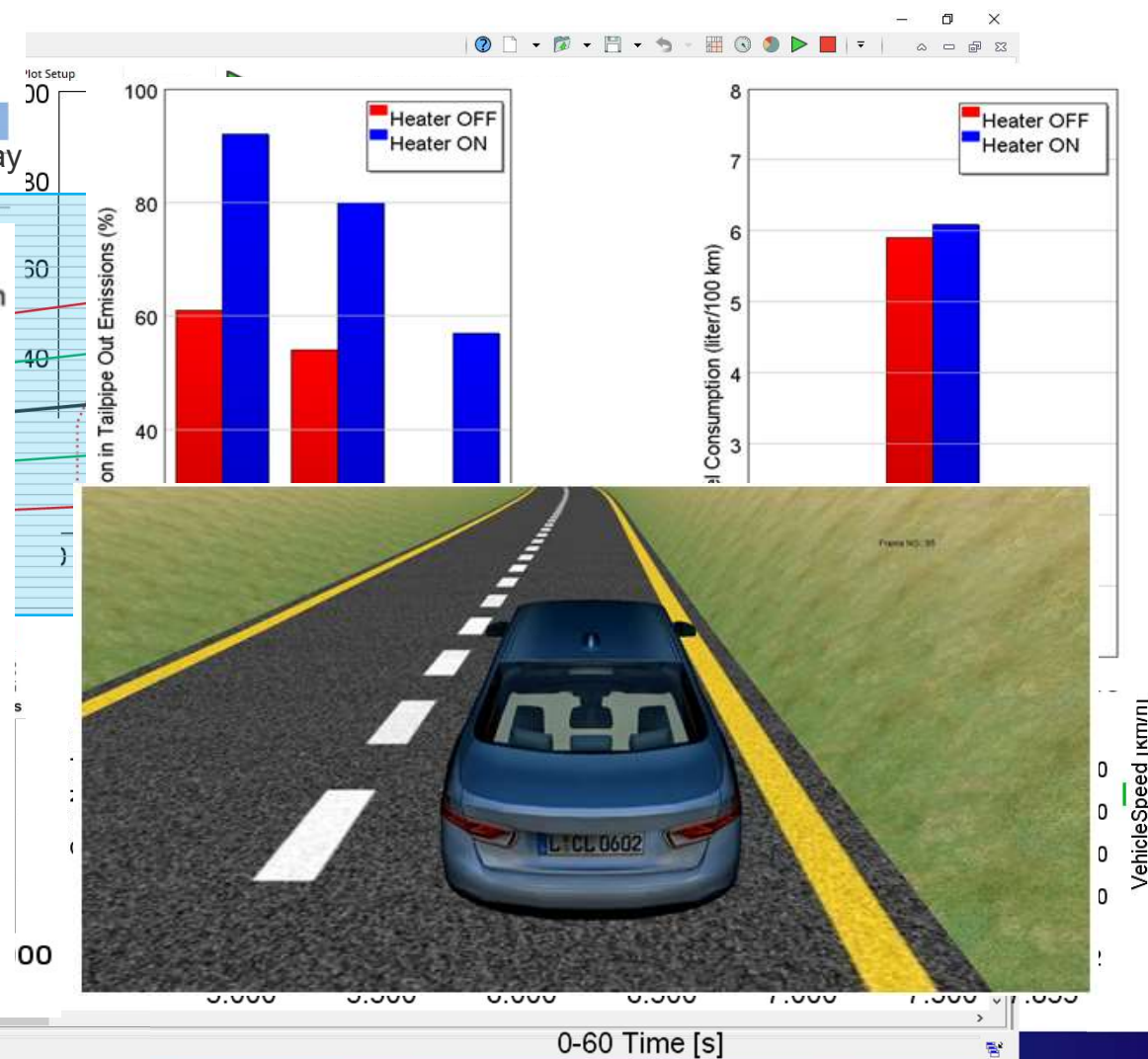
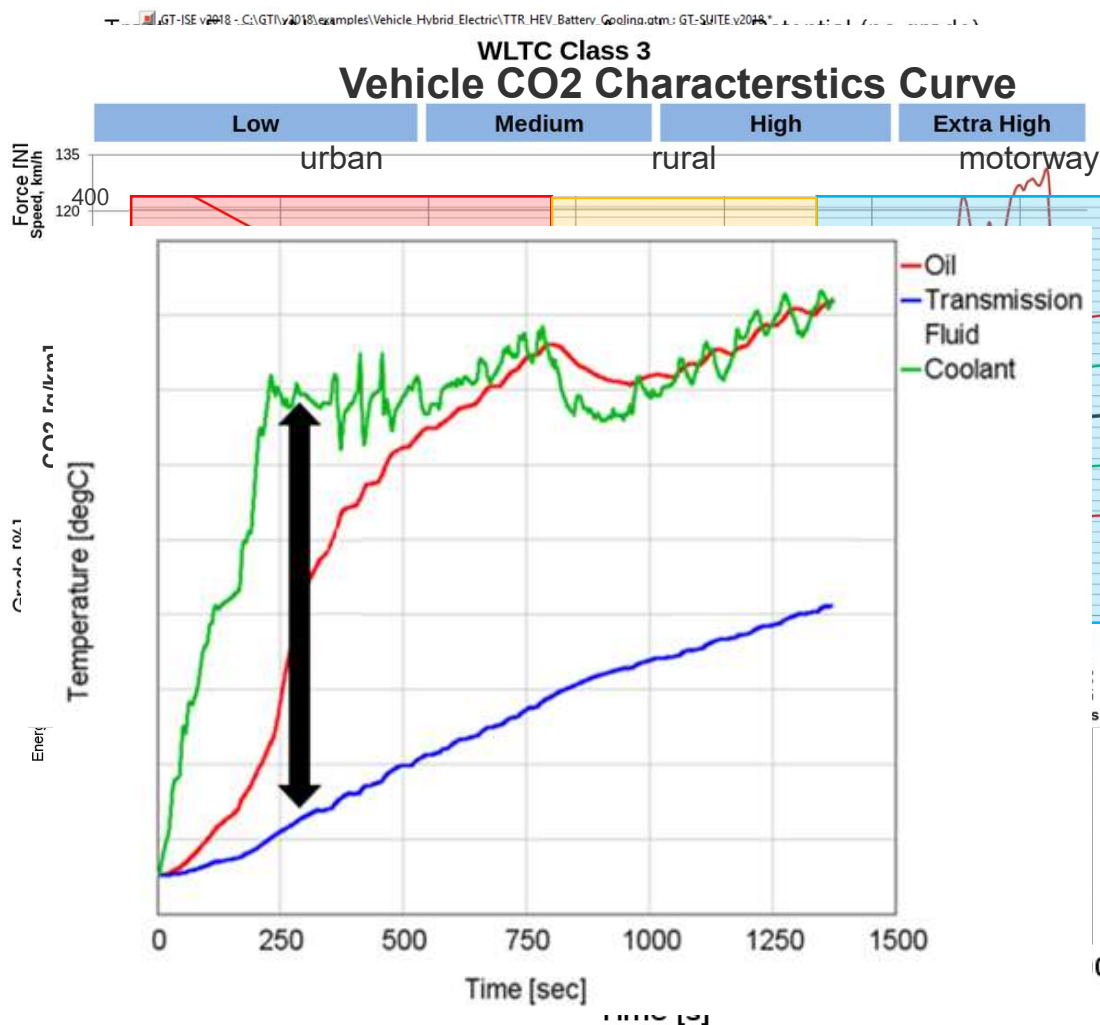
- GT-DRIVE+ 是GT-SUITE下一代整车模型构架
- 其独特的设计使用户能够快速搭建不同类型的汽车模型
 - 传统车辆
 - 新能源汽车 (HEV, PHEV, BEV, FCEV)
- 关注燃油经济性、动力性能能量管理和排放特性
- 重点关注操作界面的友好性、标准化和自动化的建模流程

GT-DRIVE+特征

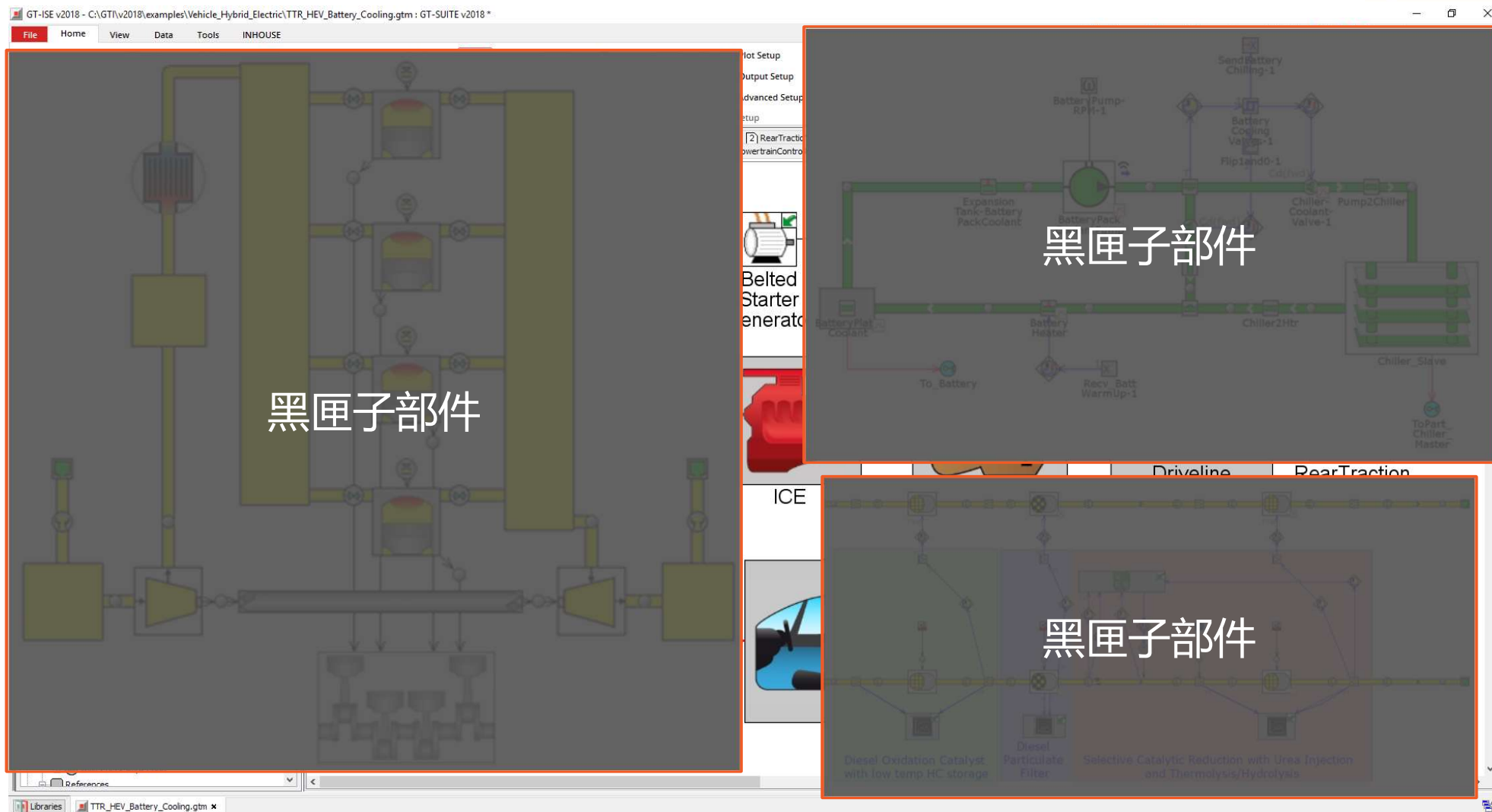
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- GT-DRIVE+ 能够提供区别于传统工具的先进特征
 - GT-DRIVE+文件扩展名: .gtdrive
- GT-DRIVE+ 解决了车辆仿真中的关键挑战, 包括:
 - 产品复杂性的增加
 - 复杂的工作过程
 - 从概念设计到最终系统的集成的方法
 - 通用化的标准平台

GT-DRIVE+: 整车仿真解决方案

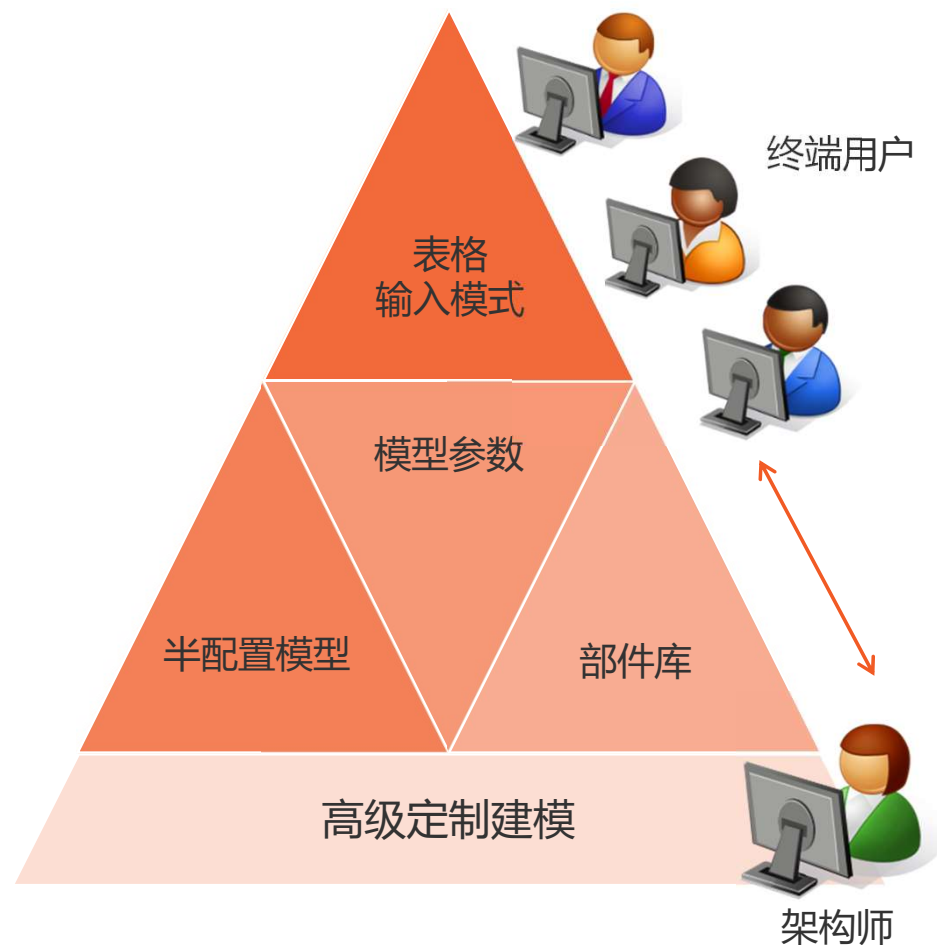


多体系统仿真的行业标准



◆ 两种工作模式

- 终端用户和架构师
- 简化终端用户交互界面
- 供架构师使用的灵活配置的框架，搭建参数化模型，供终端用户快速建模





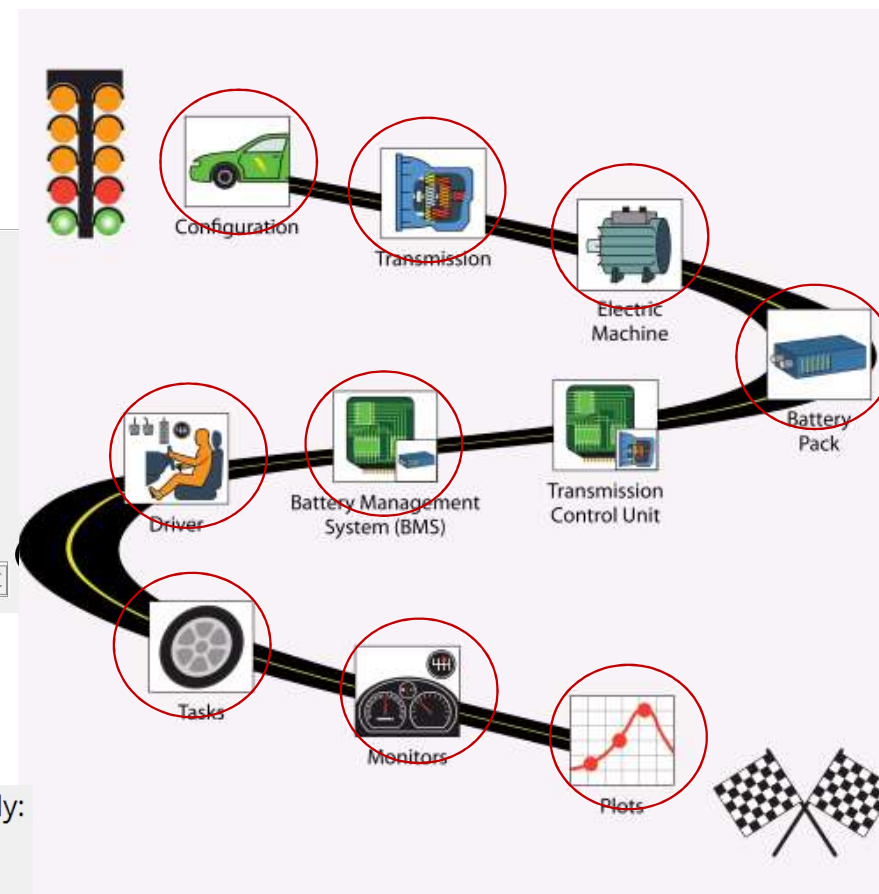
The screenshot shows the Project Explorer with the 'Vehicle-FWD' project selected. Under 'Vehicle-FWD', there are several sub-projects listed: 'Compact_...', 'Compact_...', 'Full-Siz...', 'Full-Siz...', 'Mid-Size...', and 'Mid-Size...'. Each sub-project has a small icon next to it.

pre-defined standard
choose which monitors will

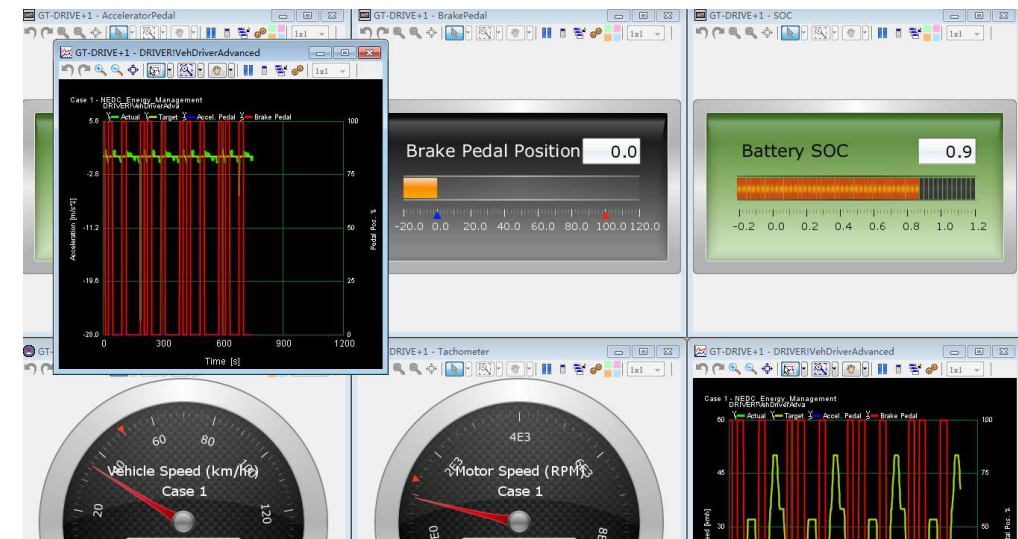
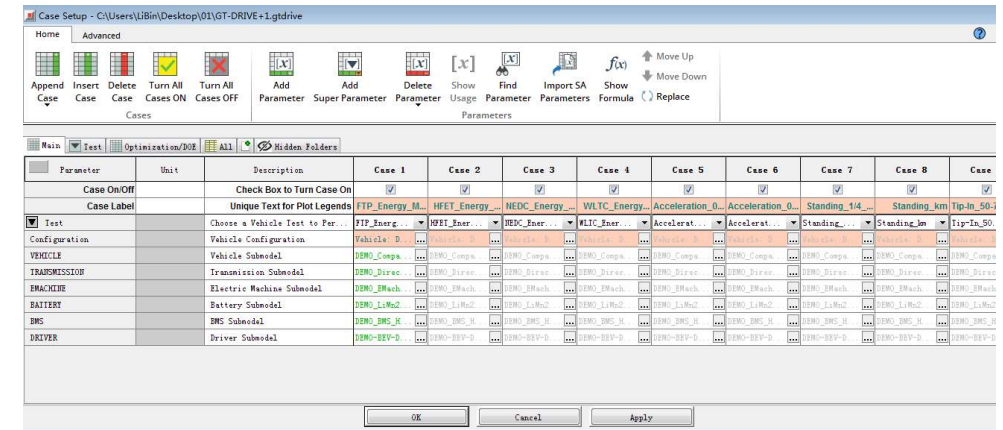
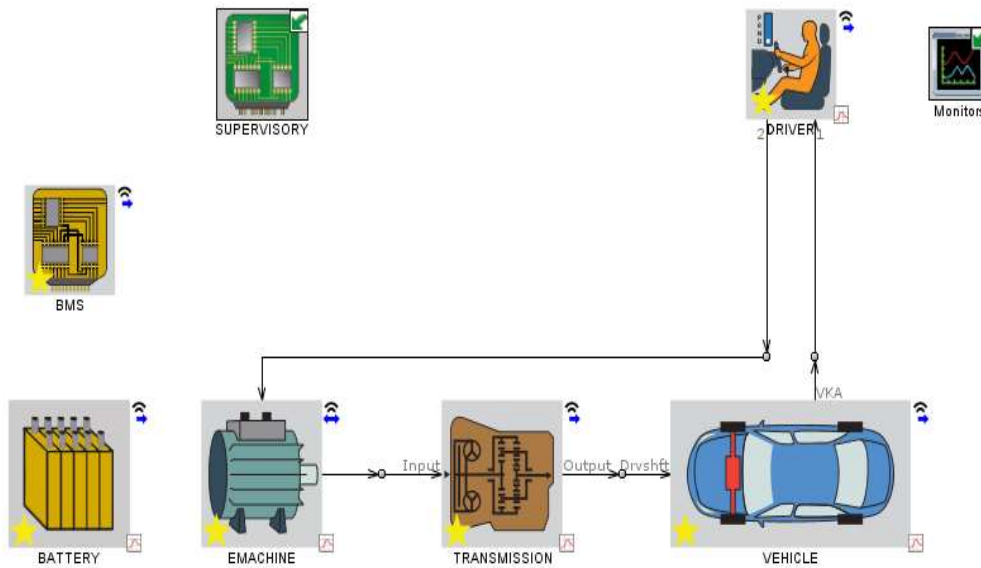
lard vehicle

ly:

Page 10 of 10

☒ Brake Pedal

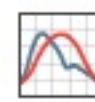
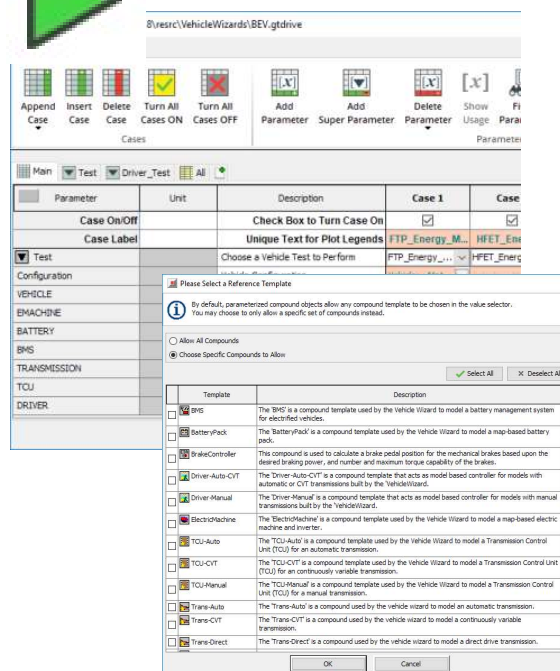
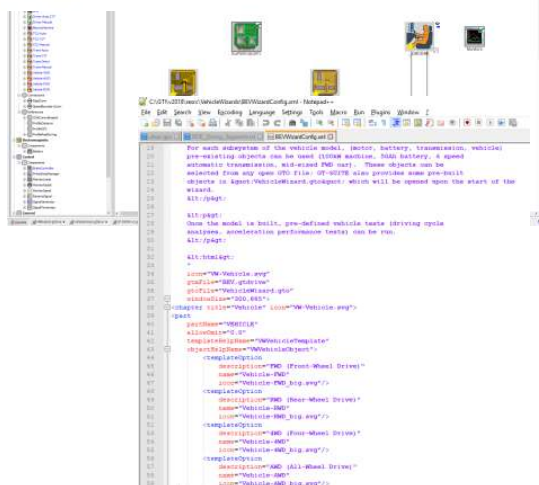
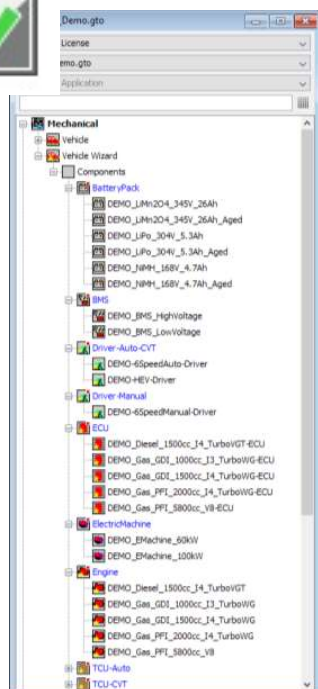
GT-DRIVE+ workflow (终端用户)



GT-DRIVE+的工作流程 (构架师)



构架师可以在GT-DRIVE+中定义新的部件、特征、计算任务和输出



ID ("Configuration" and "Tests") Table of RLTs

including RLT Short Name art name (formatted as "name").

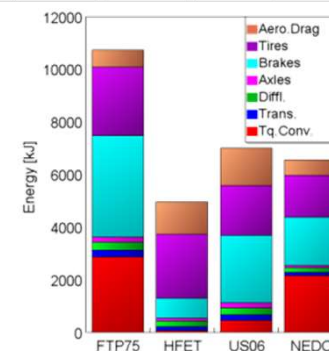
Attribute Abilities

Part Comment:

Comments

OK Cancel Apply

Object Usage	Template Documentation	RLT Index (Id)	RLT Short Name	Template for RLT Short Name	Constraint RLT	Constraint RLT value	Label
VehicleResultsSummary		0					
		1	user01.BATTERY	ign	test+	FTP_Energy_Management	FTP Battery Consumption
		2	user01.BATTERY	ign	test+	HFET_Energy_Management	HFET Battery Consumption
		3	user01.BATTERY	ign	test+	NEDC_Energy_Management	NEDC Battery Consumption
		4	user01.BATTERY	ign	test+	VLTTC_Energy_Management	VLTTC Battery Consumption
		5	time01.VBDCLE	ign	test+	Acceleration_0-60mph	0-60 mph Time
		6	time01.VBDCLE	ign	test+	Acceleration_0-100mph	0-100 mph Time
		7	time01.VBDCLE	ign	test+	Standing_1/4_Mile	Standing 1/4 Mile Time
		8	time01.VBDCLE	ign	test+	Standing_1/4_Mile	Standing 1/4 Mile Top Speed
		9	time01.VBDCLE	ign	test+	Standing_1/4_Mile	Standing 1/4 Mile Top Speed
		10	time01.VBDCLE	ign	test+	Standing_1/4_Mile	Standing 1/4 Mile Top Speed



数据库

建模

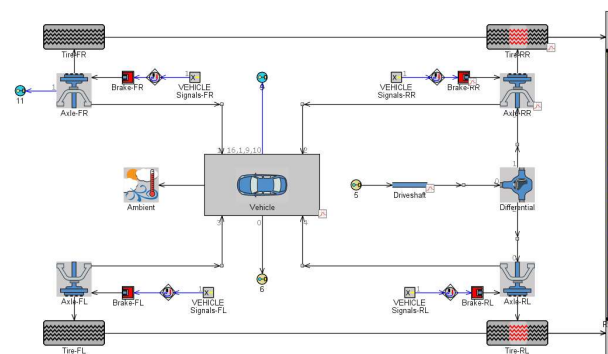
计算

结果分析

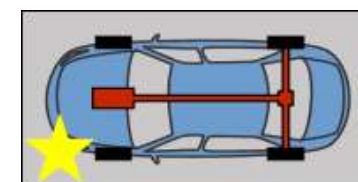
GT-DRIVE+ 使用集成化的整车部件，简化建模流程



车身模型简化



车身subassembly:
10+ 部件
100+ 特征



简化后:
1 部件
18 特征

GT-DRIVE+ 具有高效的整车分析流程

The screenshot displays the GT-DRIVE+ software interface with several key components:

- Wizard Demo.gto**: A window showing the project setup, including the license, application, and a tree view of the model components (Mechanical, Vehicle, Components, BatteryPack).
- File Menu**: A standard menu with options like New, Open, Save, Undo, Redo, Copy, Paste, and Template Library.
- Case Setup**: A window for configuring simulation cases, including a table for Case 1 through Case 6.
- VehicleResultsSummary**: A table summarizing vehicle performance metrics for different platforms and engines.
- Monitors**: A large table displaying detailed simulation results for various parameters across different cases.
- Standardized Model Setup**: A window showing the configuration of standardized components like BMS, BATTERY, and EMACHINE.
- Standardized Parts**: A window showing the configuration of standardized parts like DEMO_Diesel, DEMO_Gas, and DEMO_PFI.
- Standardized Vehicle Configuration**: A window showing the configuration of standardized vehicle components like Vehicle-RWD, RigidConn, and SpeedBoundaryCor.

	FTP Fuel Economy [mpg]	NEDC Fuel Consumption [L/100 km]	0-60 mph Time [s]	1/4 Mile Time [s]	1/4 Mile Top Speed [km/h]	50-70 mph time [s]
Platform: Conventional, Engine: 1.5L_Turbo, Vehicle: Coupe	31.9	7.64	7.71	16.2	142	5.35
Platform: Conventional, Engine: 1.2L_Turbo, Vehicle: SUV	21.8	11.3	16.0	21.0	111	15.4
Platform: PO_Mild_Hybrid, Engine: 1.5L_Turbo, Vehicle: Coupe	33.6	7.25	7.71	16.2	142	5.35
Platform: POP4_Parallel_Hybrid, Engine: 1.5L_Turbo, Vehicle: Sedan	33.7	7.24	8.05	16.5	139	5.81
Platform: POP4_Parallel_Hybrid, Engine: 1.5L_Turbo, Vehicle: Hatchback	32.7	7.43	8.42	16.7	137	6.24

标准化部件

标准化整车配置



GT-DRIVE+

新能源

HiL / SiL

Power Electronics

48V

Fuel Cell

BEV & Hybrid

VRDE

Virtu
Testbe

Alternative
Fuels

整车要求:
能量管理,性能, 动力性

车辆结构

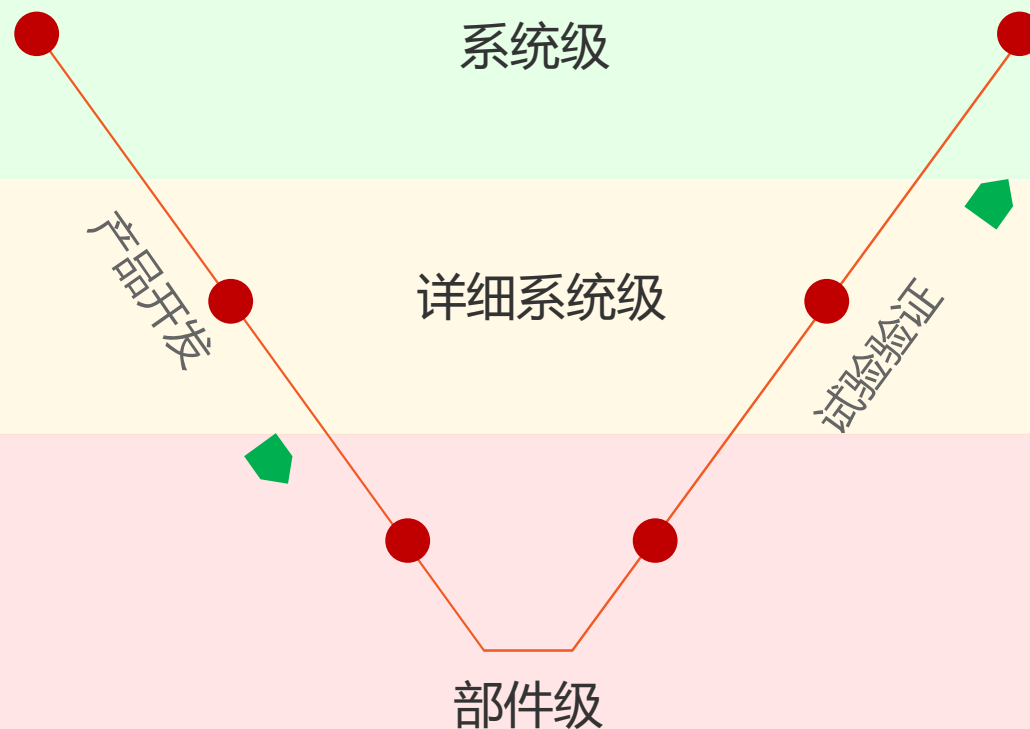
- HEV, PHEV, BEV, FCEV
- 电子部件布置
- 电池/电机型号

子系统结构

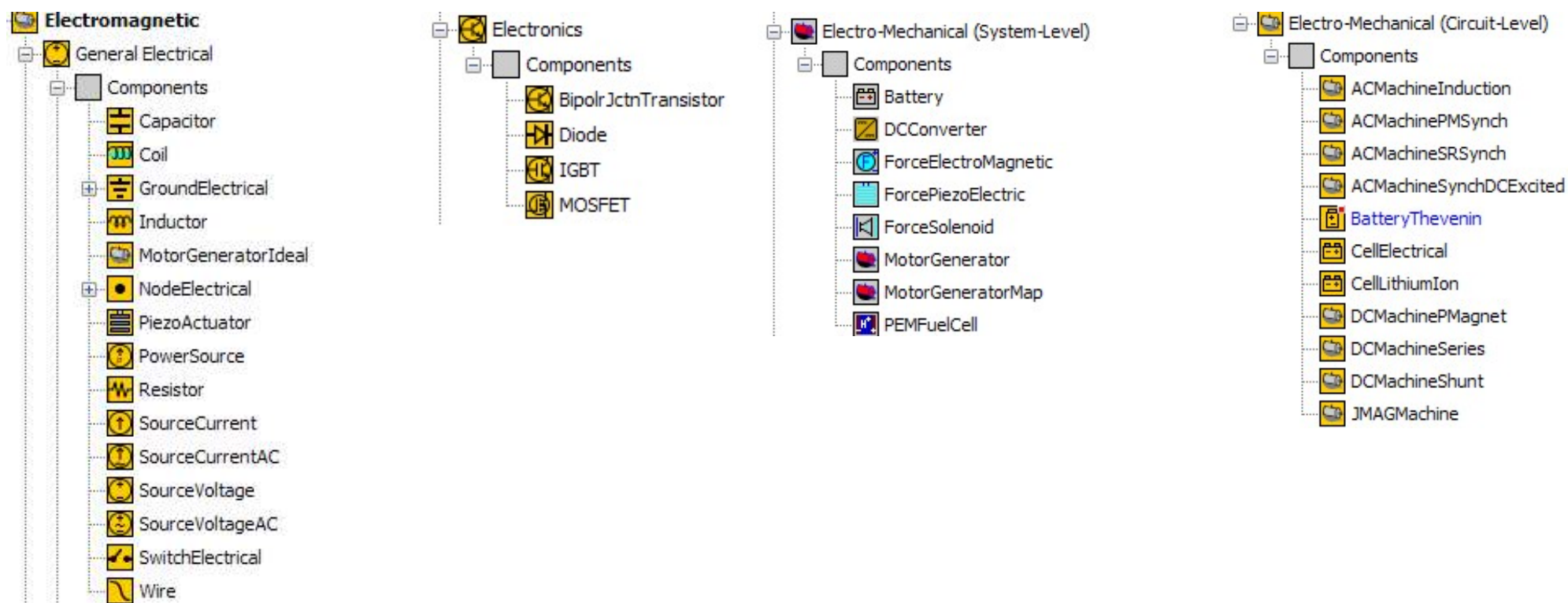
- 动力总成控制策略
- 电芯化学反应选择
- 热管理系统和控制

部件设计

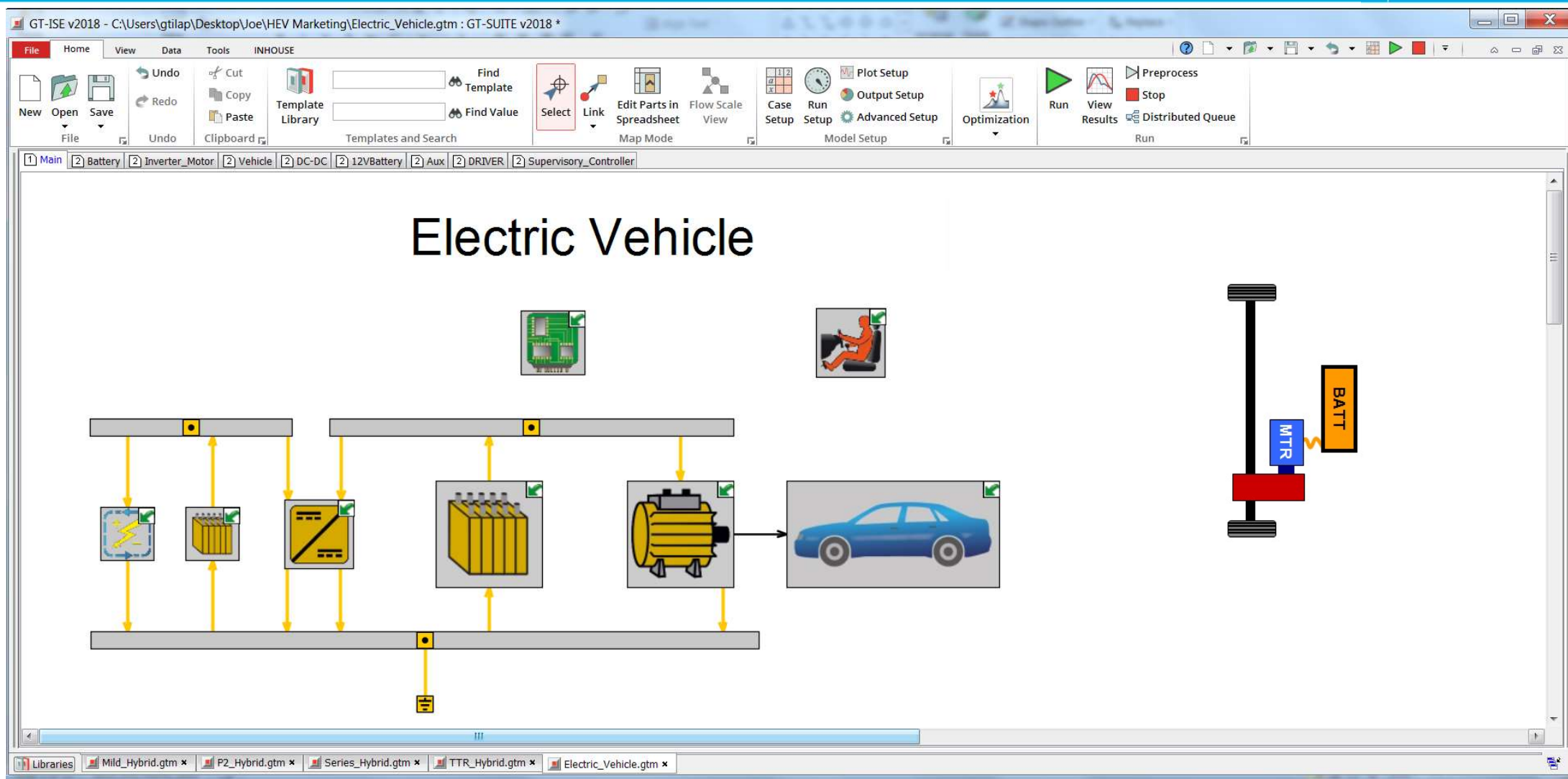
- 电池系统设计
- 电池管理系统开发
- 电机设计

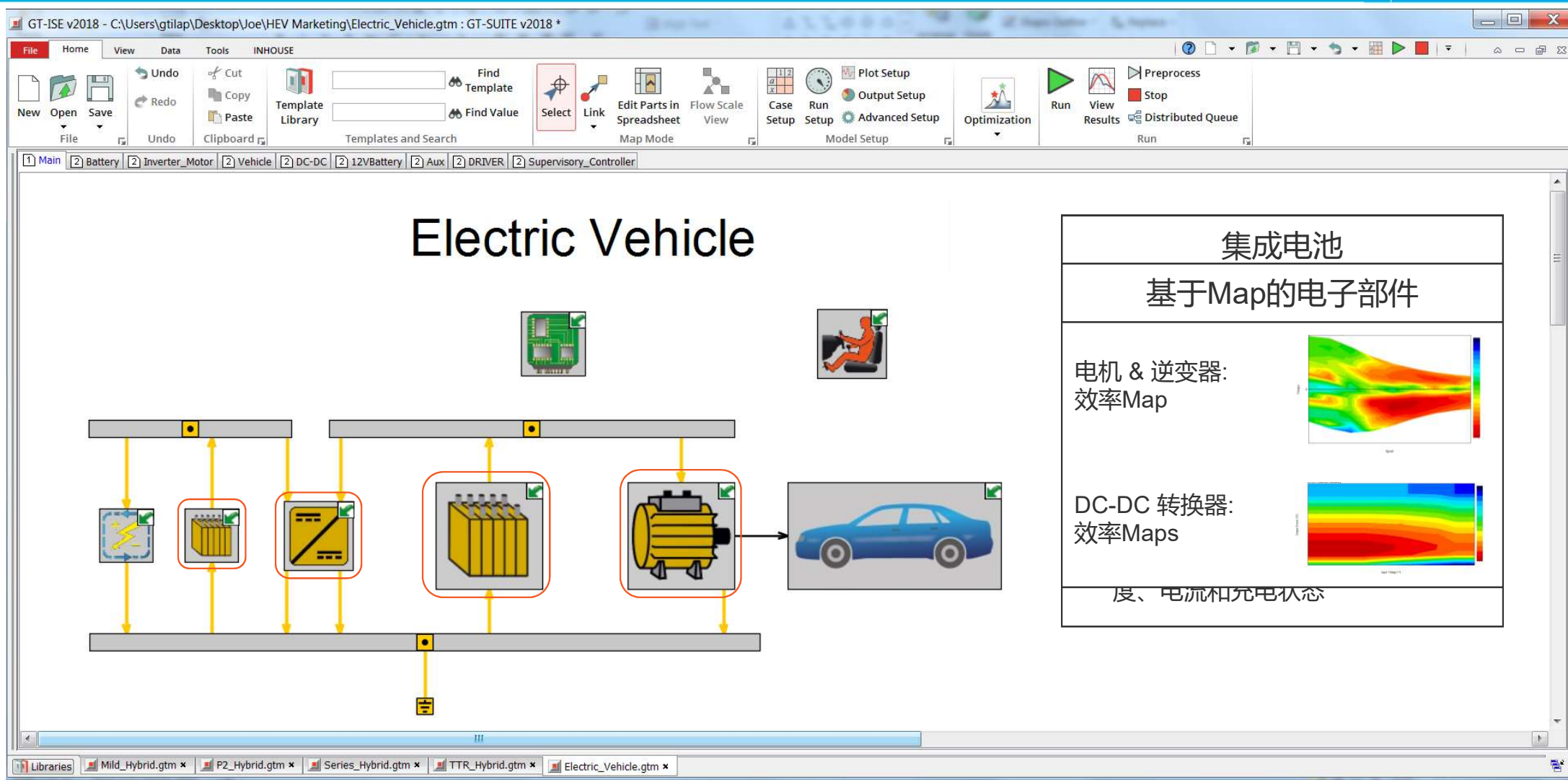


支持所有层级的电路模块建模

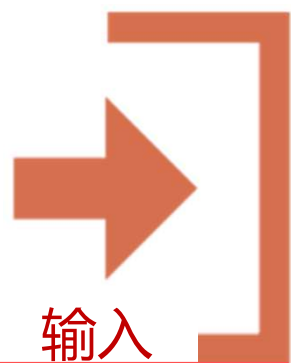


快速的概念分析





快速、概念的结构分析



结构选择
组件选择
电池规格
车辆方案

VehicleResultsSummary							
	FTP Fuel Economy [mpg]	NEDC Fuel Consumption [L/100 km]	0-60 mph Time [s]	1/4 Mile Time [s]	1/4 Mile Top Speed [km/h]	50-70 mph time [s]	
Platform: Conventional, Engine: 1.5L_Turbo, Vehicle: Coupe	31.9	7.64	7.71	16.2	142	5.35	
Platform: Conventional, Engine: 1.2L_Turbo, Vehicle: SUV	21.8	11.3	16.0	21.0	111	15.4	
Platform: P0_Mild_Hybrid, Engine: 1.5L_Turbo, Vehicle: Coupe	33.6	7.25	7.71	16.2	142	5.35	
Platform: POP4_Parallel_Hybrid, Engine: 1.5L_Turbo, Vehicle: Sedan	33.7	7.24	8.05	16.5	139	5.81	
Platform: POP4_Parallel_Hybrid, Engine: 1.5L_Turbo, Vehicle: Hatchback	32.7	7.43	8.42	16.7	137	6.24	
DEMO_P0_304V_5.3Ah_Aged	31.9	7.64	7.71	16.2	142	5.35	
DEMO_NIMH_168V_4.7Ah	21.8	11.3	16.0	21.0	111	15.4	
DEMO_NIMH_168V_4.7Ah_Aged	21.8	11.3	16.0	21.0	111	15.4	
BMS	33.6	7.25	7.71	16.2	142	5.35	
DEMO_BMS_highVoltage	33.6	7.25	7.71	16.2	142	5.35	
DEMO_BMS_lowVoltage	33.6	7.25	7.71	16.2	142	5.35	
Driver-Auto-CVT	33.7	7.24	8.05	16.5	139	5.81	
DEMO_6SpeedAuto-Driver	33.7	7.24	8.05	16.5	139	5.81	
DEMO-HEV-Driver	33.7	7.24	8.05	16.5	139	5.81	
Driver-Manual	33.7	7.24	8.05	16.5	139	5.81	
DEMO_6SpeedManual-Driver	33.7	7.24	8.05	16.5	139	5.81	
ECU	33.7	7.24	8.05	16.5	139	5.81	
DEMO_Diesel_1500cc_I4_TurboVG	33.7	7.24	8.05	16.5	139	5.81	
DEMO_Gas_GDI_1000cc_I3_Turbo	33.7	7.24	8.05	16.5	139	5.81	
DEMO_Gas_GDI_1500cc_I4_Turbo	33.7	7.24	8.05	16.5	139	5.81	
DEMO_Gas_PFI_2000cc_I4_Turbo	33.7	7.24	8.05	16.5	139	5.81	
DEMO_Gas_PFI_5800cc_V8-ECU	33.7	7.24	8.05	16.5	139	5.81	
ElectricMachine	33.7	7.24	8.05	16.5	139	5.81	
DEMO_EMachine_60kW	33.7	7.24	8.05	16.5	139	5.81	
DEMO_EMachine_100kW	33.7	7.24	8.05	16.5	139	5.81	
Engine	33.7	7.24	8.05	16.5	139	5.81	
DEMO_Diesel_1500cc_I4_TurboVG	33.7	7.24	8.05	16.5	139	5.81	
DEMO_Gas_GDI_1000cc_I3_Turbo	33.7	7.24	8.05	16.5	139	5.81	
DEMO_Gas_GDI_1500cc_I4_Turbo	33.7	7.24	8.05	16.5	139	5.81	
DEMO_Gas_PFI_2000cc_I4_Turbo	33.7	7.24	8.05	16.5	139	5.81	
DEMO_Gas_PFI_5800cc_V8	33.7	7.24	8.05	16.5	139	5.81	
TCU-Auto	33.7	7.24	8.05	16.5	139	5.81	
TCU-CVT	33.7	7.24	8.05	16.5	139	5.81	

部件库

标准化输出格式 GPS 数据

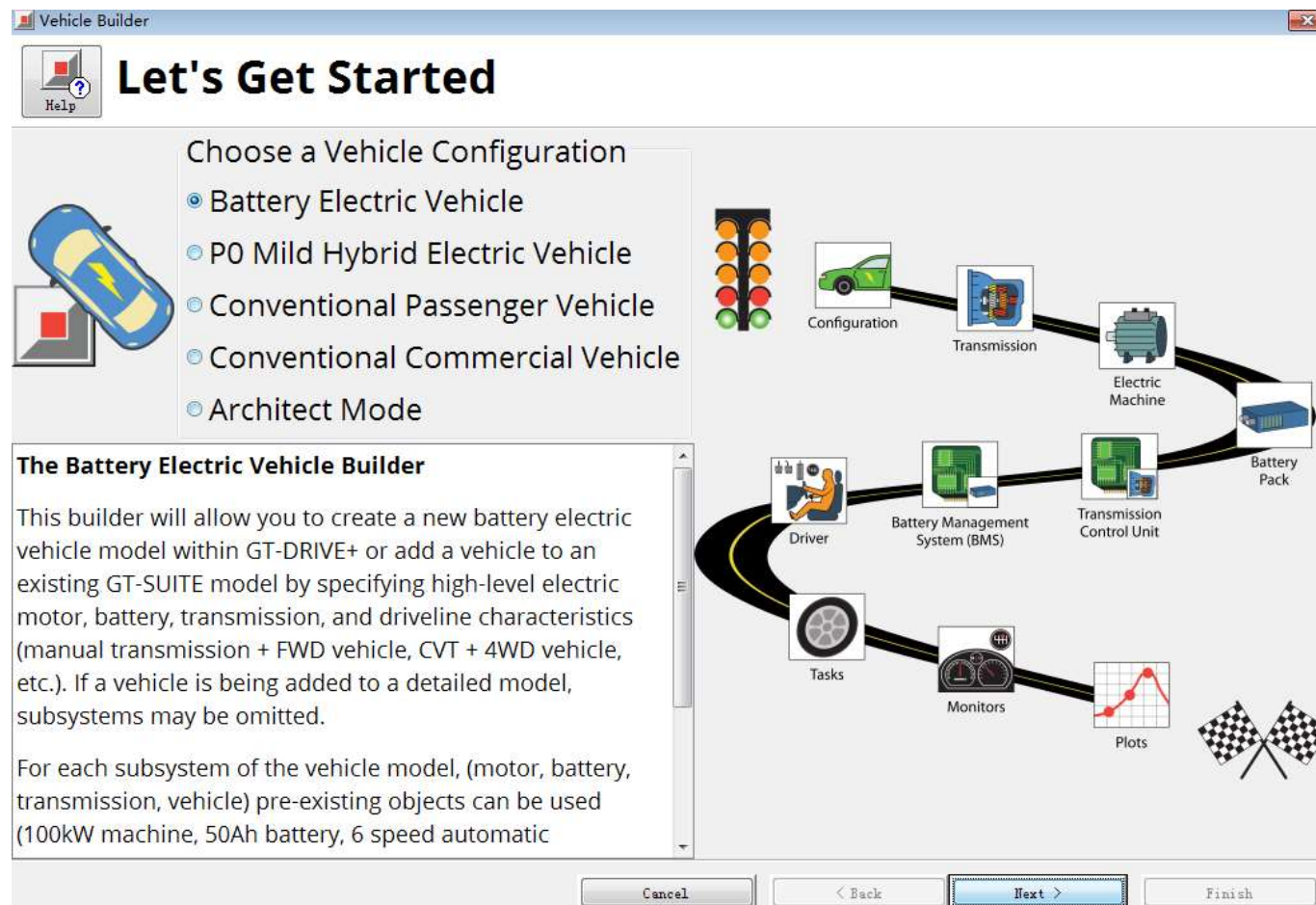
范围/油耗
性能
能量损失
架构优化

集成 workflow

- 纯电动
- 混动
- 传统车
- 自定义类型

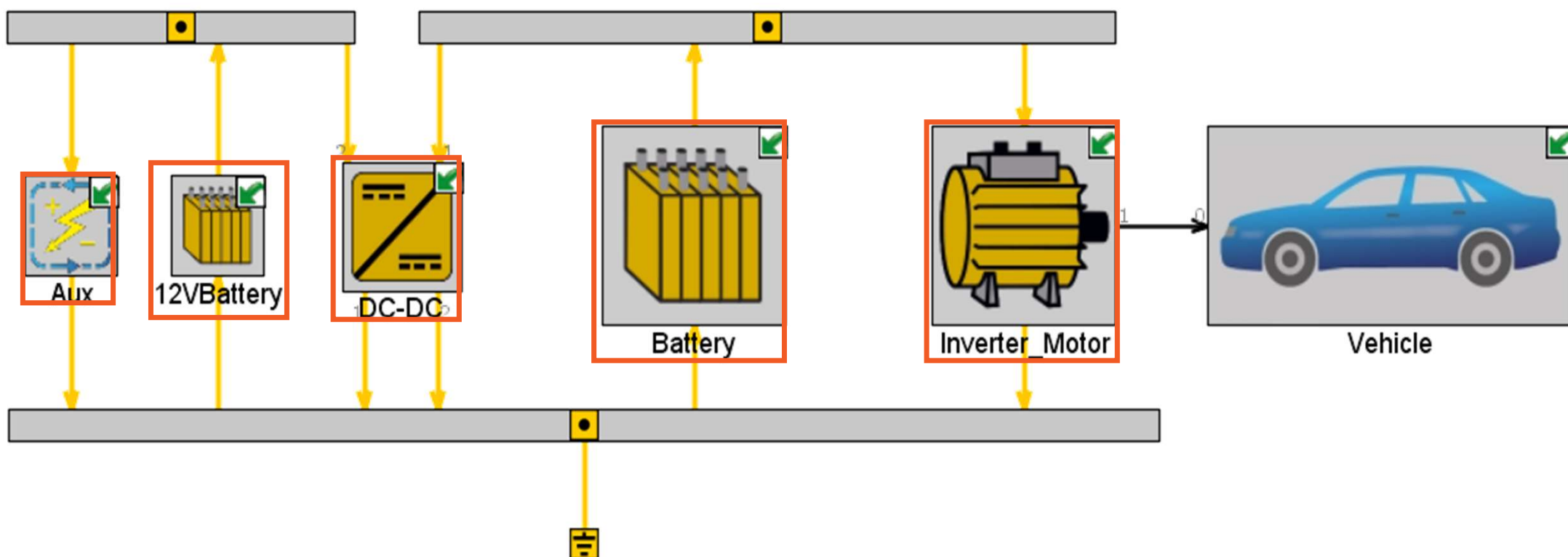
内置多工况

- 循环工况
- 加速工况
- Tip-In工况



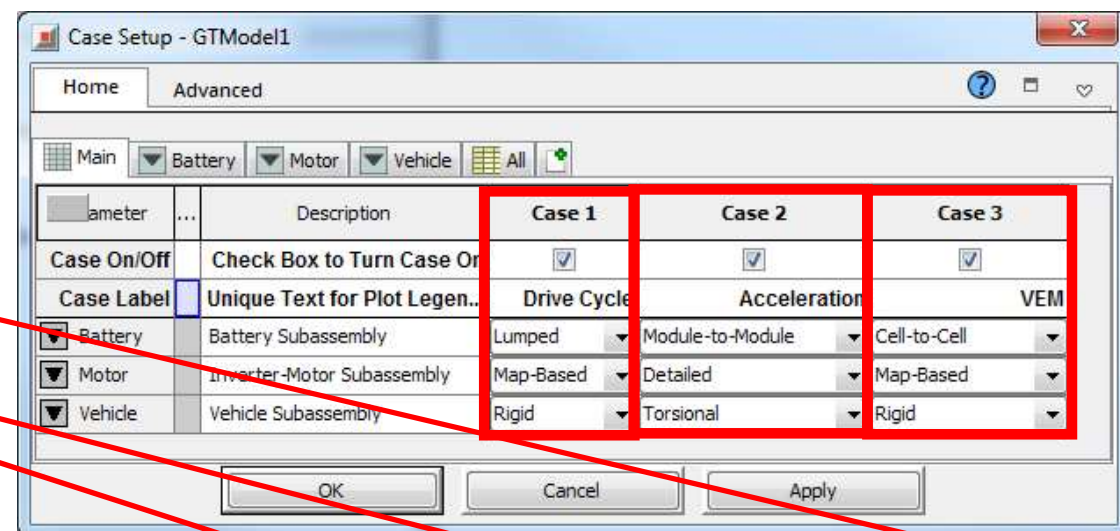
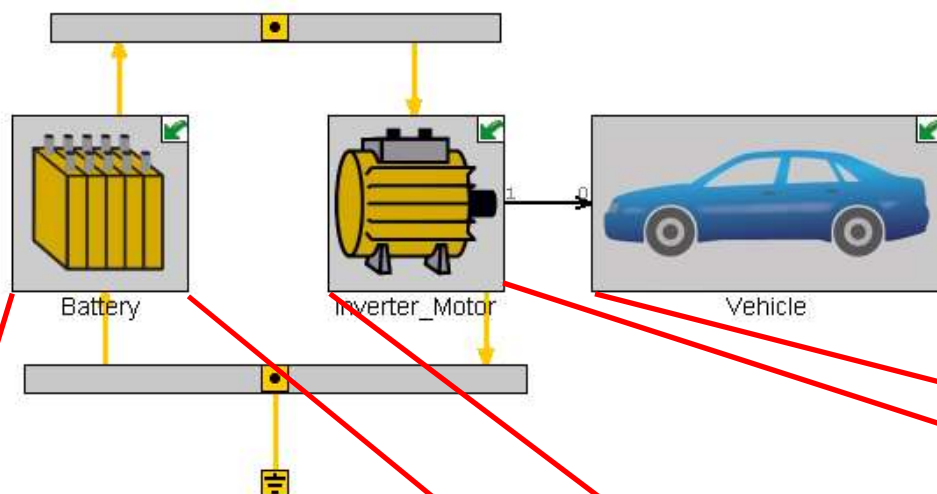
系统级和回路及的电气部件可相互连接

- 系统级部件内置电气连接端口

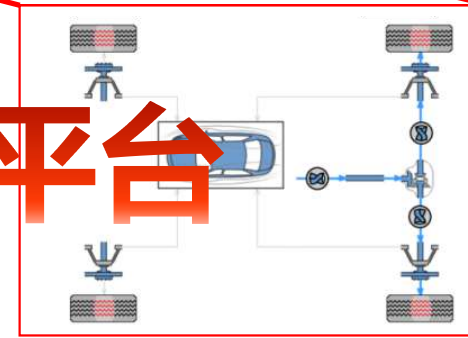
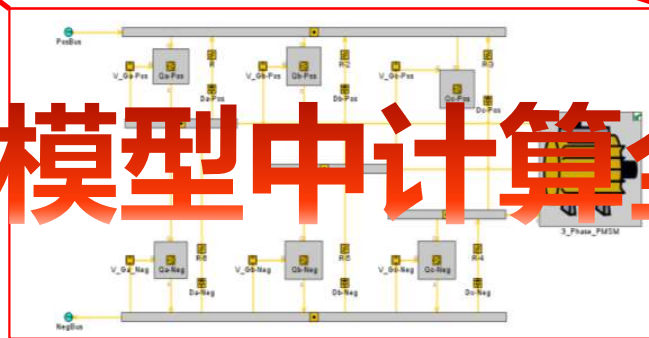


互通的部件/组件

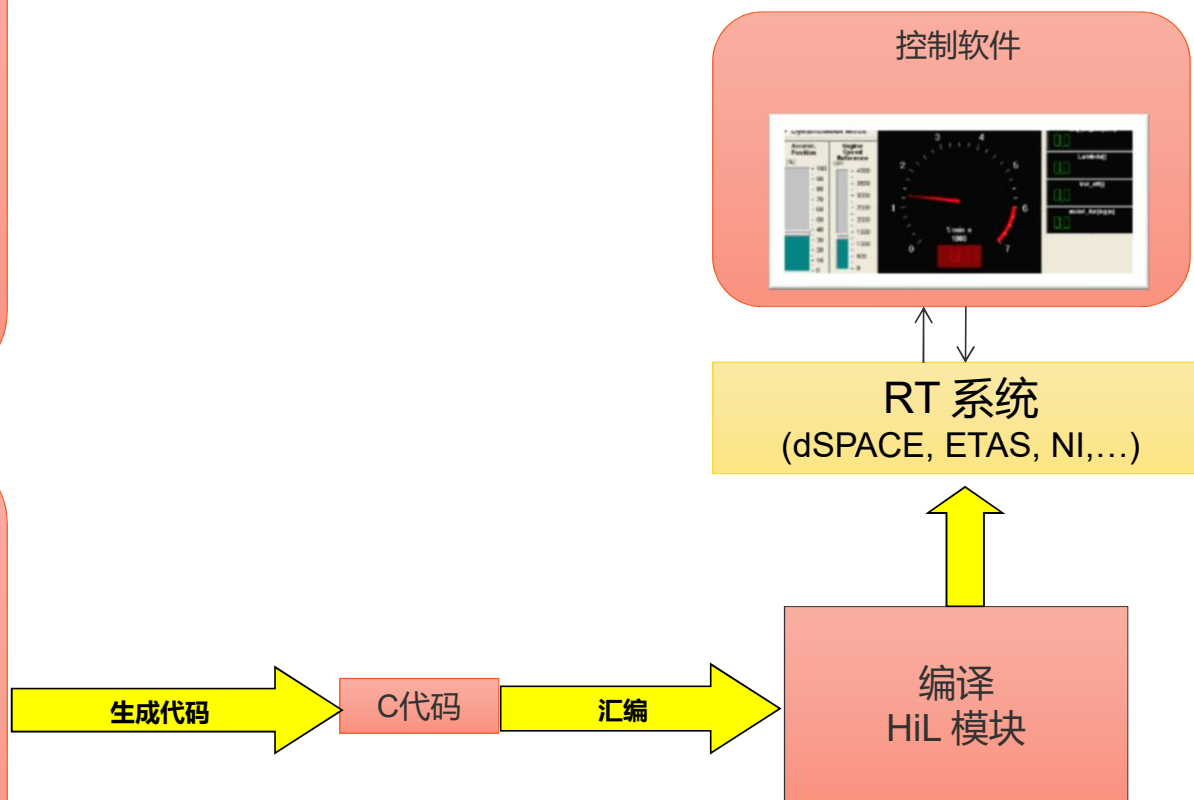
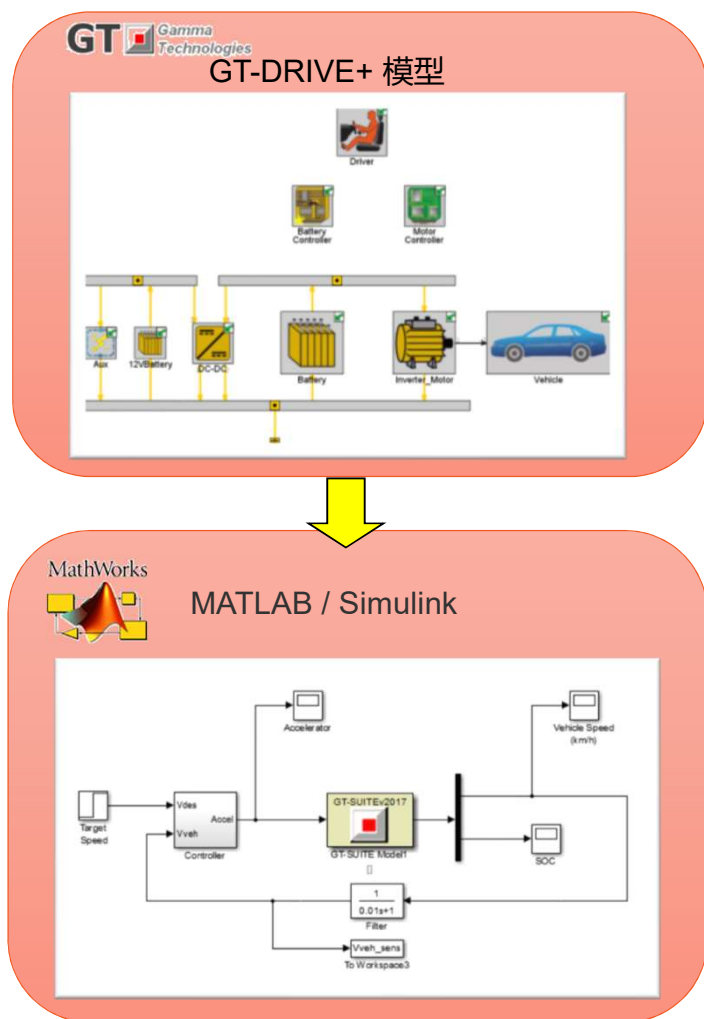
连结性保持不变，可在不同Case中改变状态



在1个模型中计算全部平台



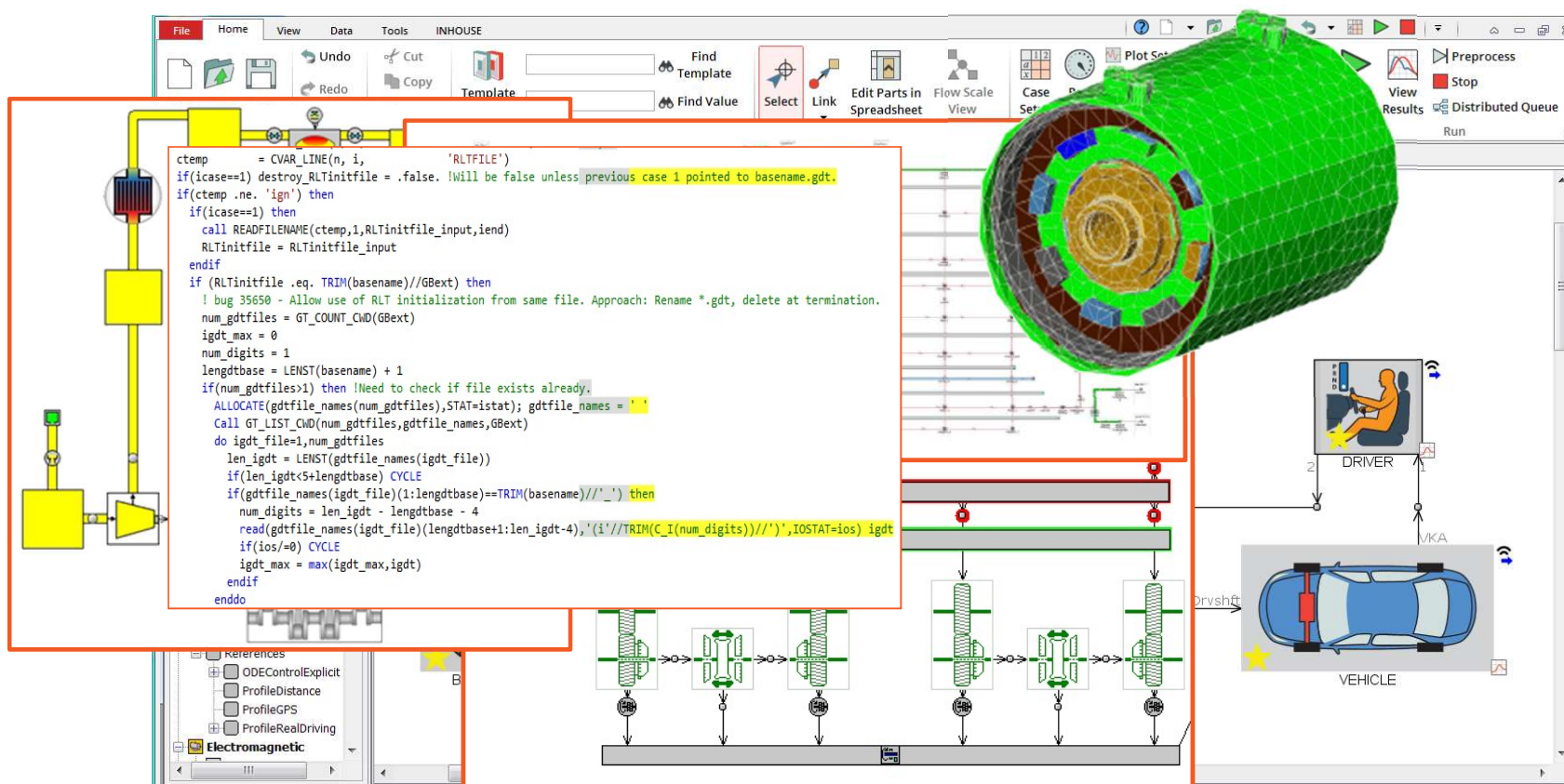
与Simulink和“X”-i-L系统的无缝链接



GT-DRIVE+是GT-SUITE的组成部分



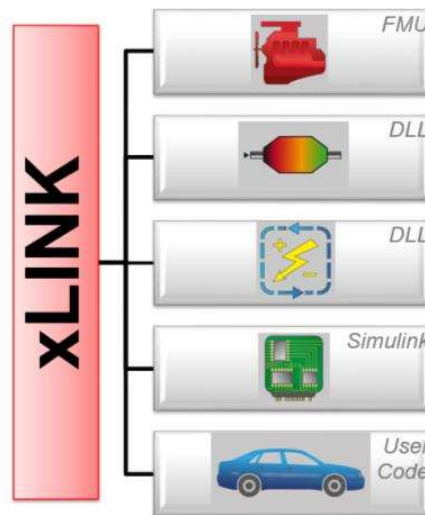
GT-DRIVE+ 可以快速搭建整车模型，并转换成已广泛应用的GTM模型



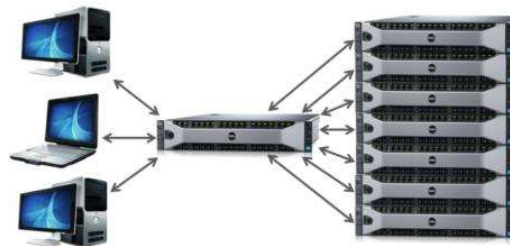
其他特征



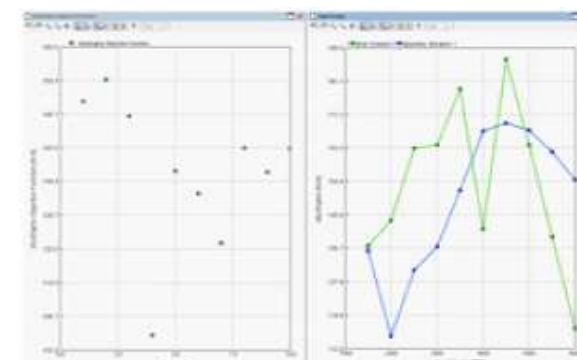
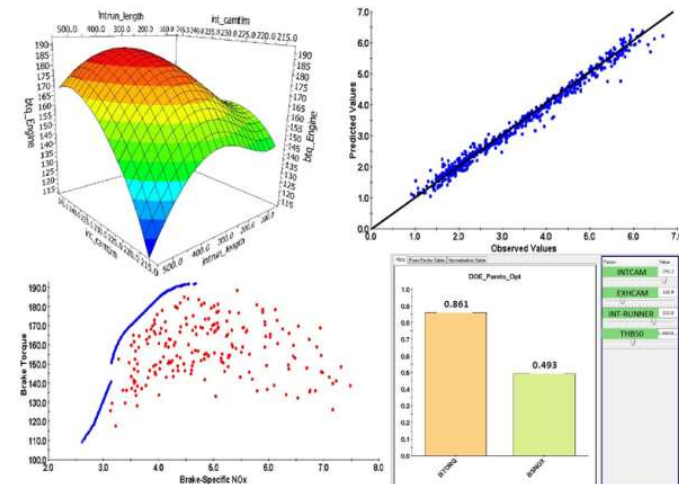
集成PLM工具库



通用耦合仿真接口
xLINK



分布式计算



DOE和优化

GT-DRIVE+ 加速产品开发

- GT-DRIVE+ 是下一代车辆仿真架构，旨在处理下一代复杂的车辆架构
- GT-DRIVE+ 能够提供可随时运行的车辆特征和建模流程，提高用户工作效率
- GT-DRIVE+ 为架构师提供了高效搭建和维护车辆模拟的平台，供终端用户使用
- GT-DRIVE+ 是GT-SUITE大平台的一部分，可与其他系统集成仿真

感谢倾听
期待与您的进一步合作 😊



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