



IDAJ中国
GT小组

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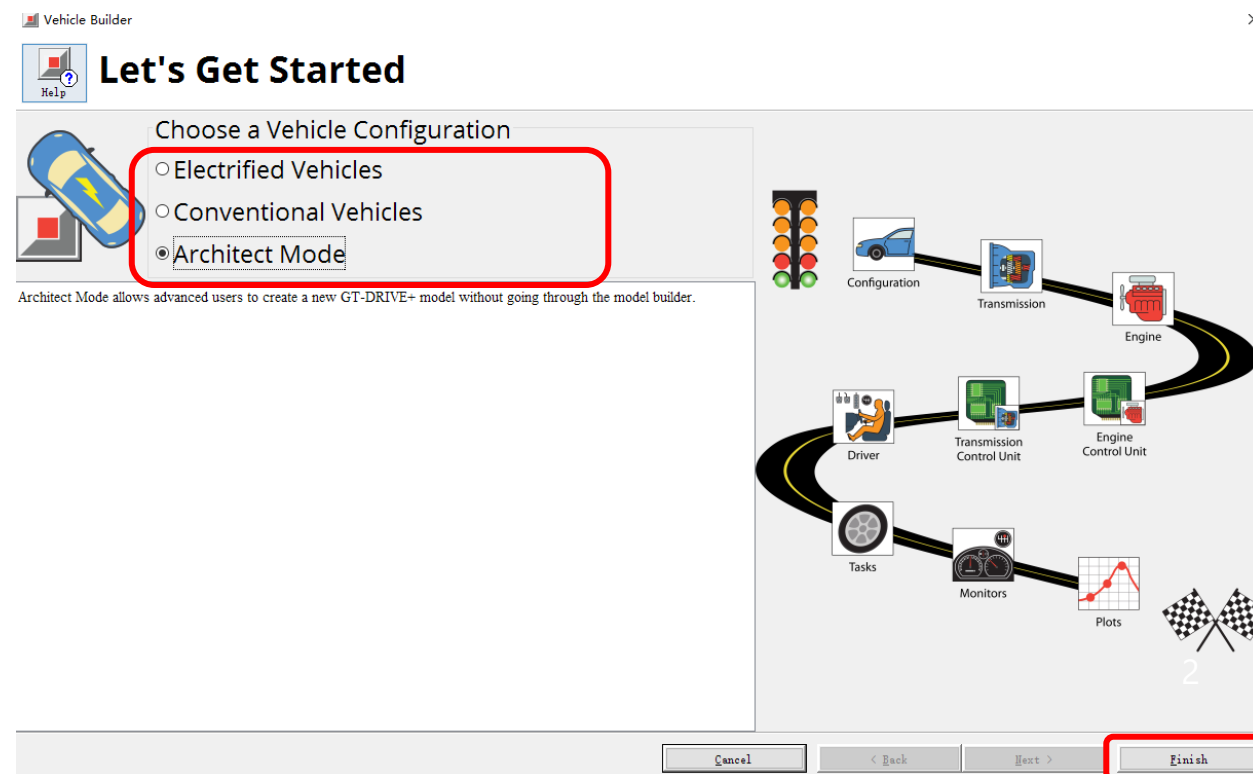
GT-DRIVE+培训教程

GT-DRIVE+

■ 创建一个 gtdrive 文件(1/3)

GT-DRIVE+是一个界面友好的整车设置向导，可以快速设置整车模型，本例将建立一个 P0 形式轻混车的**模板**

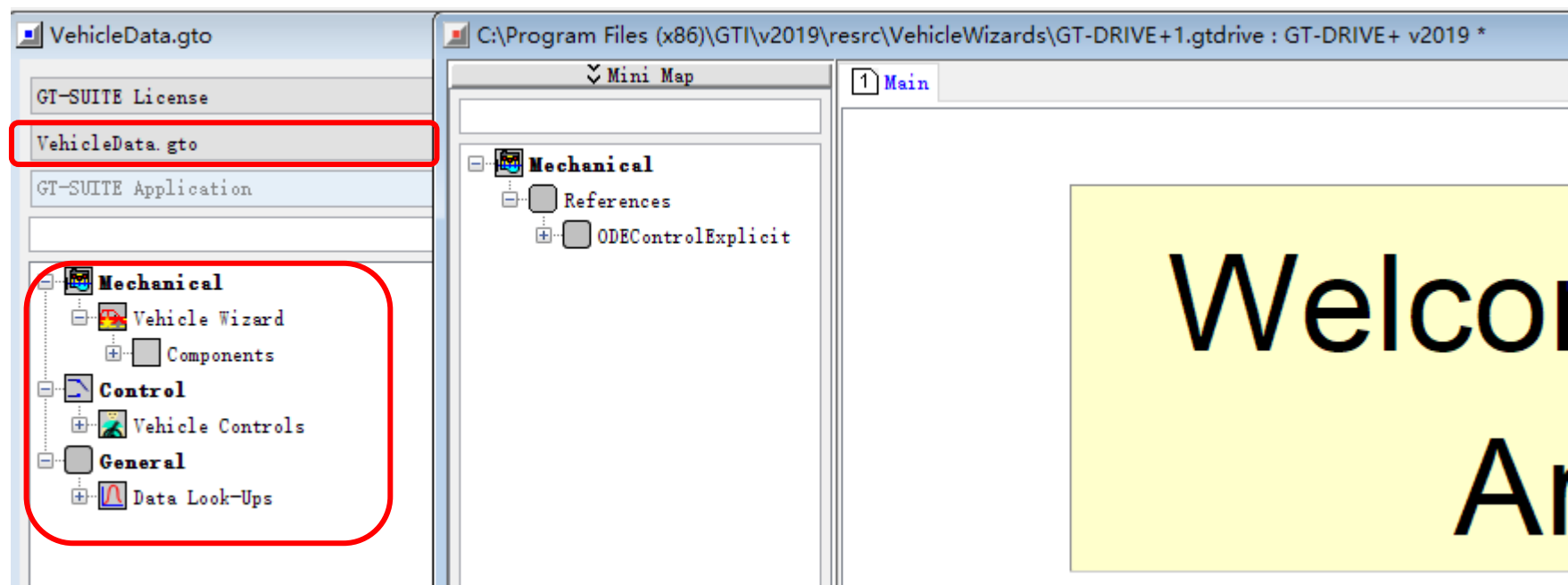
- 新建文件，选择 GT-DRIVE+，点击 Finish
- 选择 Architect Mode（自己建立），点击 finish，创建一个 .gtdrive 文件
- 注：每一个模式的相关对象都存储在 gto 文件中，可以后续调用



GT-DRIVE+

■ 创建一个 gtdrive 文件(2/3)

- 点击 libraries, 选择 VehicleData.gto 文件, 可看到其所包含的对象

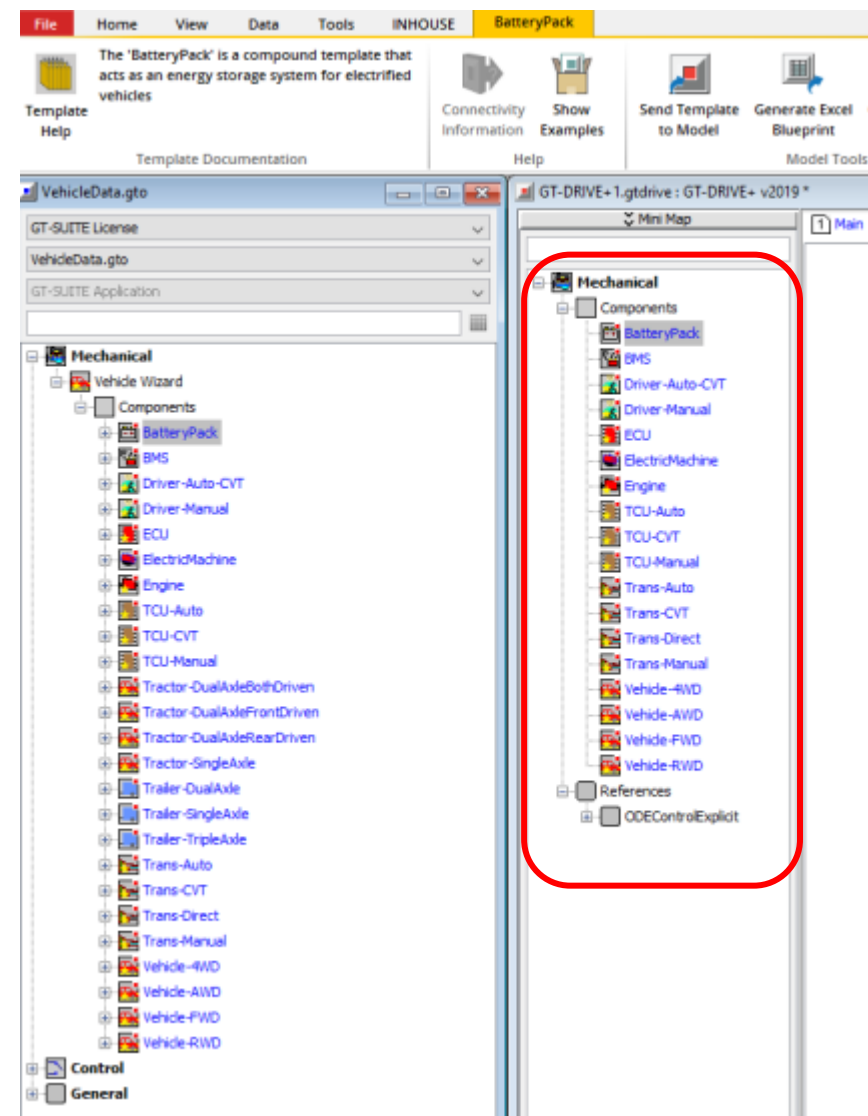


GT-DRIVE+

■ 创建一个 gtdrive 文件(3/3)

- 拖动以下模板到 project map 中
- 保存文件为 P0MildHybrid_Tutorial.gtdrive

● BatteryPack	● TCU-Manual
● BMS	● Trans-Auto
● Driver-Auto-CVT	● Trans-CVT
● Driver-Manual	● Trans-Direct
● ECU	● Trans-Manual
● ElectricMachine	● Vehicle-4WD
● Engine	● Vehicle-AWD
● TCU-Auto	● Vehicle-FWD
● TCU-CVT	● Vehicle-RWD



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■ 创建对象并拖入map中(1/6)

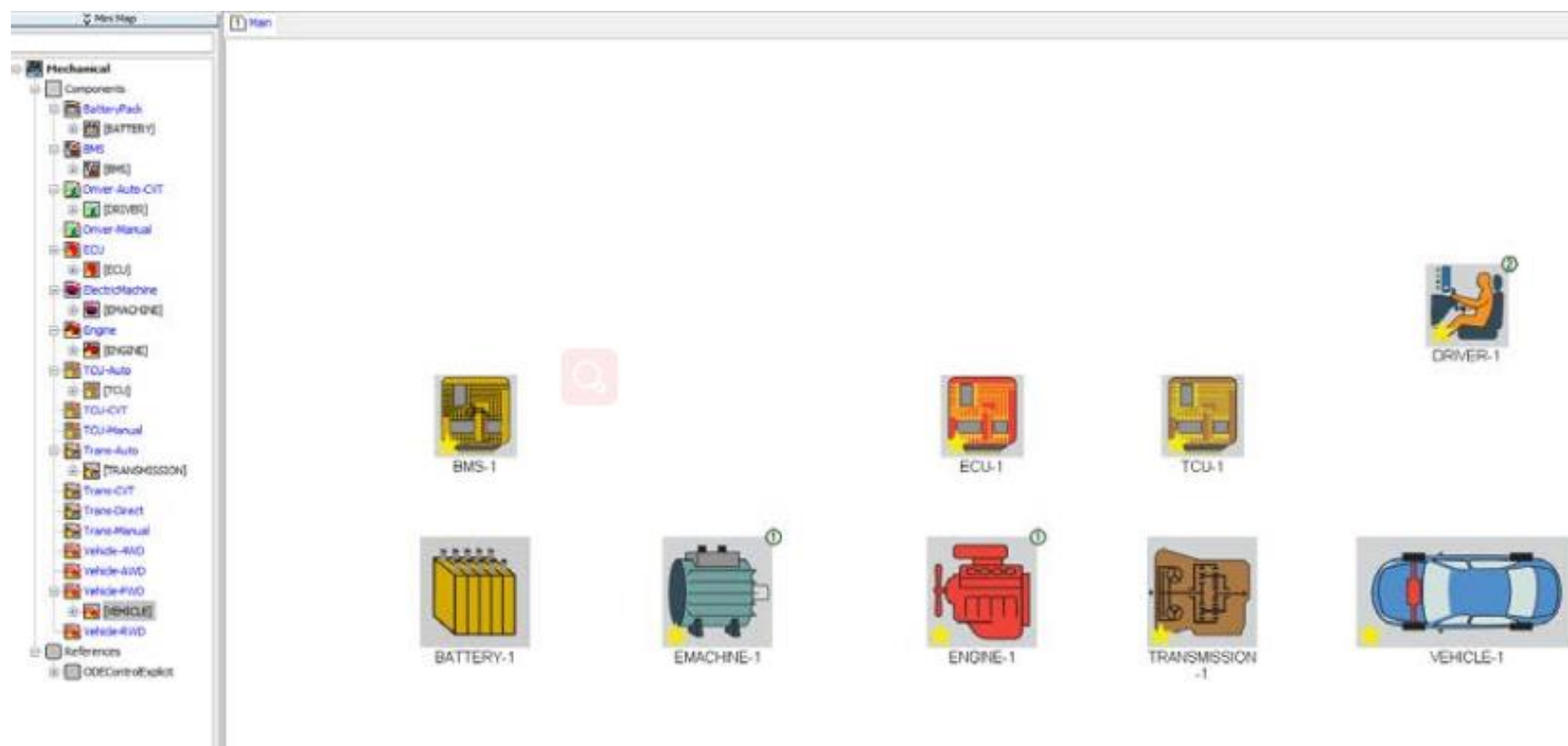
● 建立以下对象

Template	New Object Name
BatteryPack	BATTERY
BMS	BMS
Driver-Auto-CVT	DRIVER
ECU	ECU
ElectricMachine	EMACHINE
Engine	ENGINE
TCU-Auto	TCU
Trans-Auto	TRANSMISSION
Vehicle-FWD	VEHICLE

GT-DRIVE+

■ 创建对象并拖入map中(2/6)

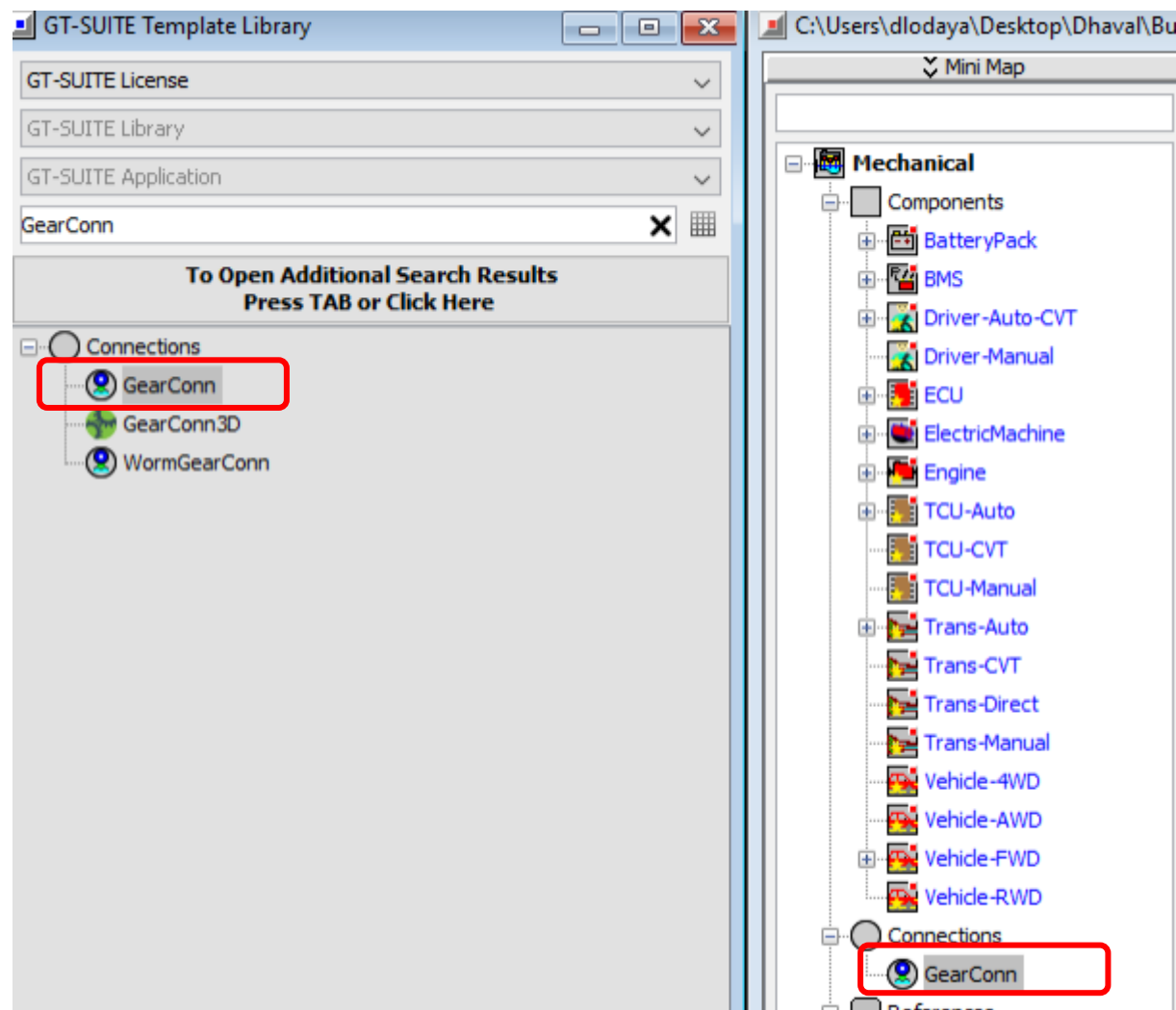
- 拖入map中
- 重命名每个part,
将名称中的-1删除



GT-DRIVE+

■ 创建对象并拖入map中(3/6)

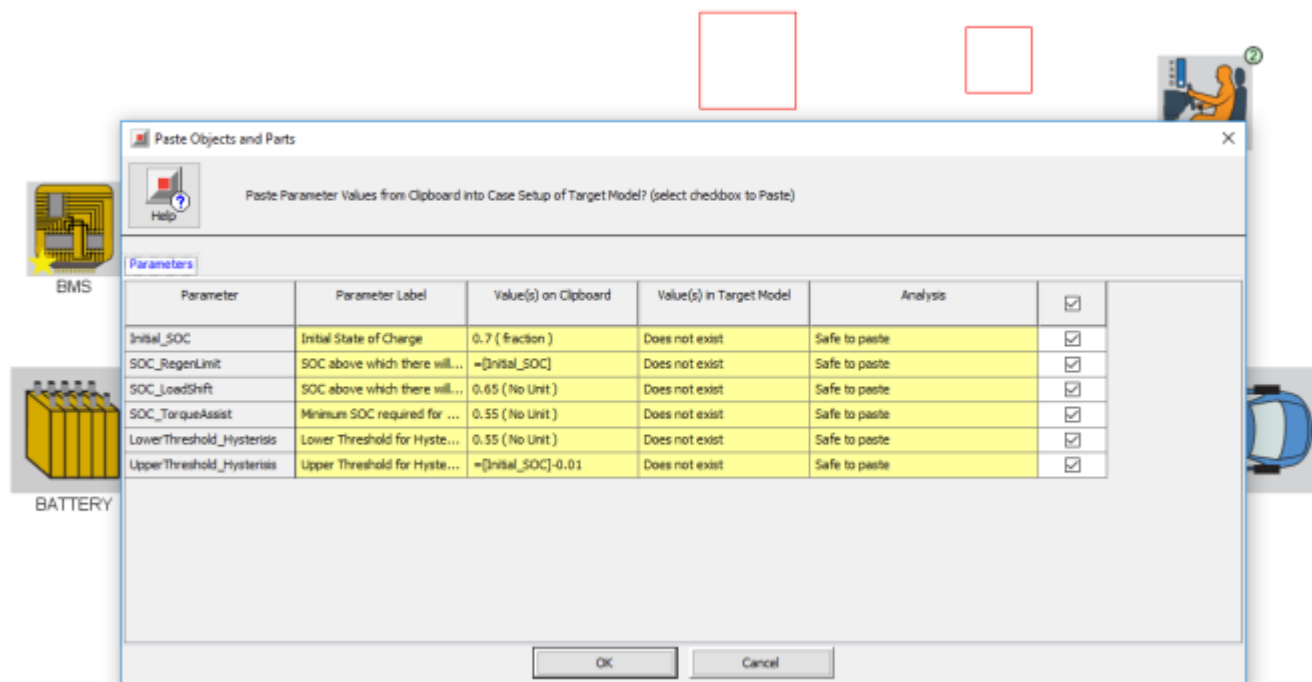
- 从 VehicleData.gto 中向project中
添加齿轮对象
- 将该齿轮放到发动机和电机之间,
并命名为 ICE-BAS_Gearing



GT-DRIVE+

■ 创建对象并拖入map中(4/6)

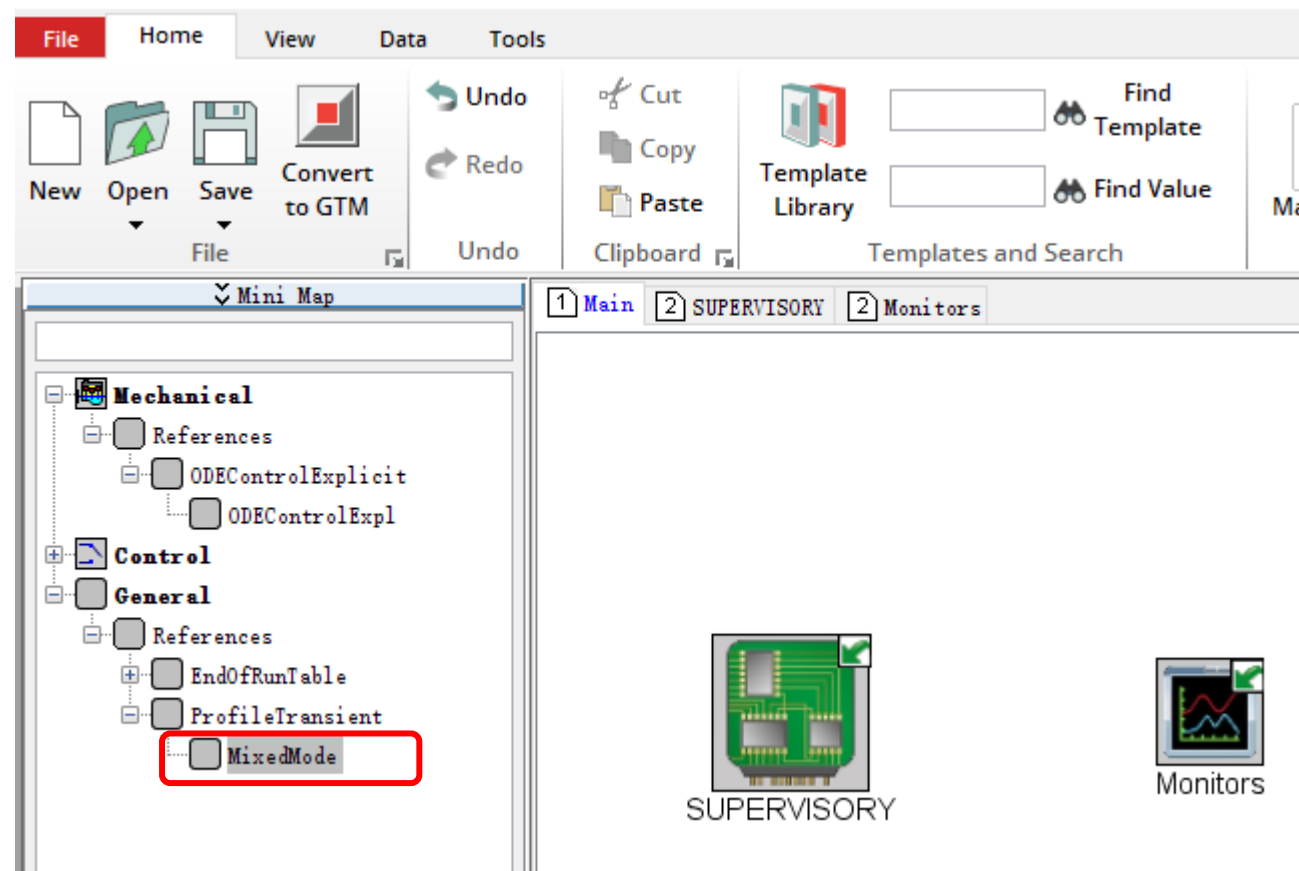
- 打开相同目录下的
SupervisoryController.gtdrive, 复制
黏贴 Supervisory 和 Monitors
- 出现提示框, 点击 OK



GT-DRIVE+

■ 创建对象并拖入map中(5/6)

- 复制 MixedMode 到原模型中，混合模式是指在一个测试循环中存在多种驾驶模式（目标速度、目标加速度、目标加速踏板位置）



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■ 创建对象并拖入map中(6/6)

● 模型如下图所示



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■ 连接模型

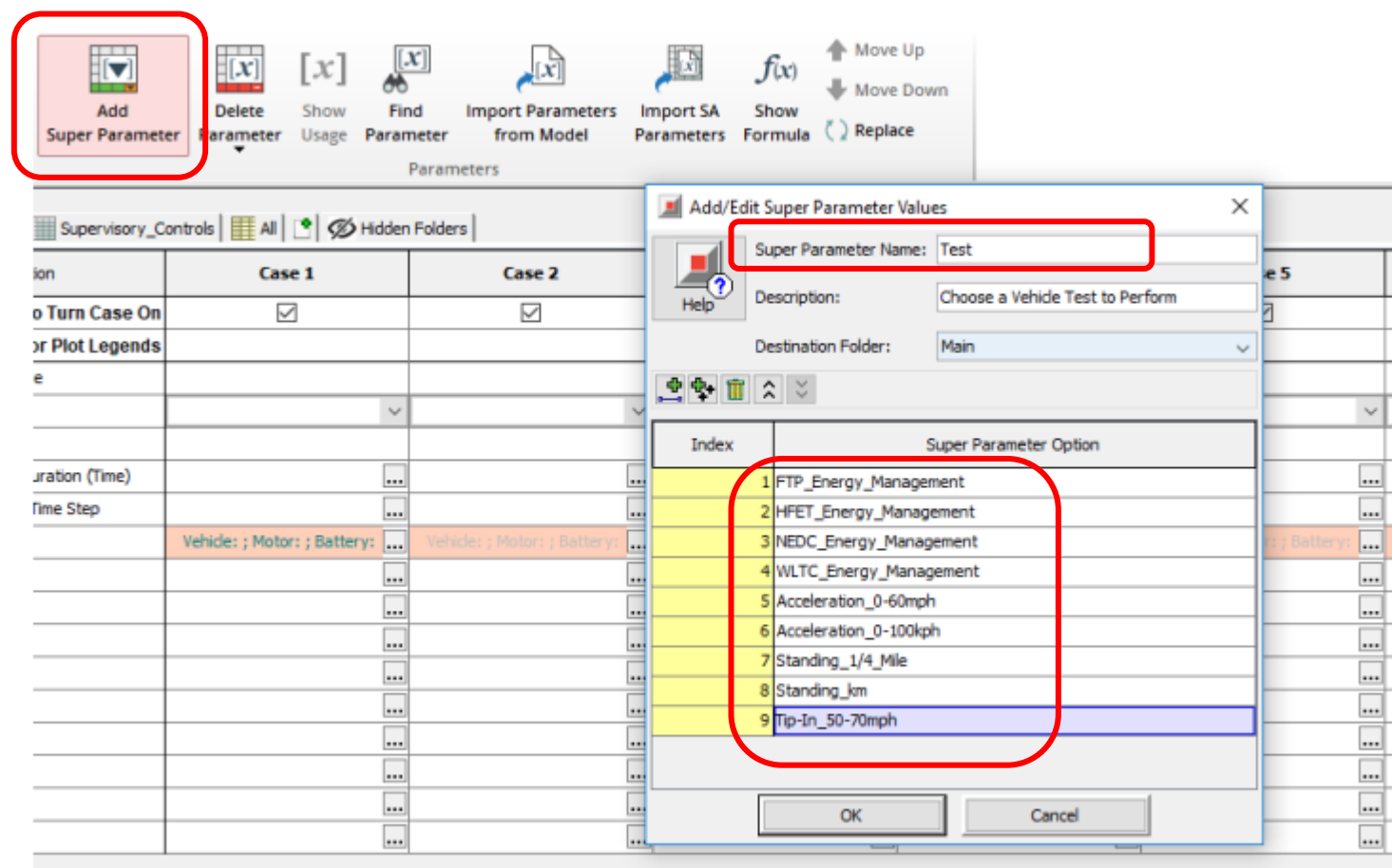
Link From	Link To	Link ID for part
EMACHINE	ICE-BAS_Gearing	-
ICE-BAS_Gearing	ENGINE	ENGINE: Flywheel (Load)
ENGINE	TRANSMISSION	ENGINE: Flywheel (Load)
		TRANSMISSION: Transmission Input (Input)
TRANSMISSION	VEHICLE	TRANSMISSION: Transmission Output (Output)
		VEHICLE: Driveshaft (Drvshft)
VEHICLE	DRIVER	VEHICLE: VKA Connection (VKA)
		DRIVER: VehicleBody (Body)
DRIVER	ENGINE	DRIVER: Prime Mover
		ENGINE: Flywheel (Load)

GT-DRIVE+

■ 定义 Case Setup(1/12)

- 在 Case Setup 中，点击 Add Super Parameter，命名为 test，并增加 9 个选项（对应不同的测试工况）

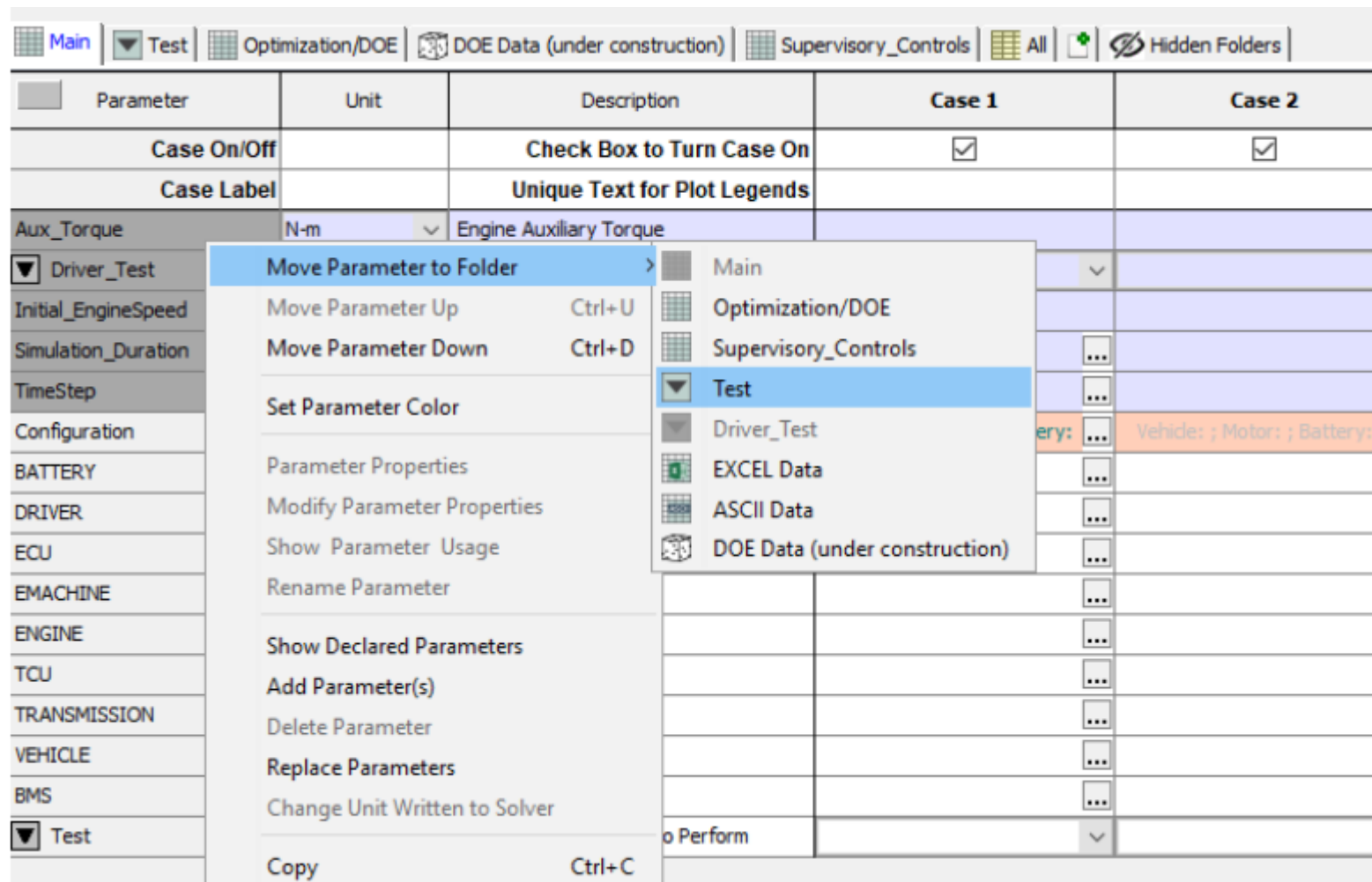
Index	Super Parameter Option
1	FTP_Energy_Management
2	HFET_Energy_Management
3	NEDC_Energy_Management
4	WLTC_Energy_Management
5	Acceleration_0-60mph
6	Acceleration_0-100kph
7	Standing_1/4_Mile
8	Standing_1km
9	Tip-In_50-70mph



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■ 定义 Case Setup(2/12)

- 将一些参数移动到 Test(super parameter) 中



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■ 定义 Case Setup(3/12)

● 不同 Case 下分配不同的 Super Parameter

Case No	Test
1	FTP_Energy_Management
2	HFET_Energy_Management
3	NEDC_Energy_Management
4	WLTC_Energy_Management
5	Acceleration_0-60mph
6	Acceleration_0-100kph
7	Standing_1/4_Mile
8	Standing_km
9	Tip-In_50-70mph

GT-DRIVE+

■ 定义 Case Setup(4/12)

- 将 Case Label 设置为 [TEST]

GT-ISE v2019 - C:\Program Files (x86)\GTI\2019\tutorials\Modeling_Applications\Vehicle_Driveline_and_HEV\GT-DRIVE+_Frame

File Home View Data Tools Case Setup Advanced

New Open Save Convert to GTM Append Case Insert Case Delete Case Turn All Cases ON Turn All Cases OFF Parameters Optimization Run

Main Supervisory_Controls Test Driver_Test Design of Experiments All

Parameter	Unit	Description	Case 1	Case 2
Case On/Off		Check Box to Turn Case On	☒	☒
Case Label		Unique Text for Plot Legends	[Test]	HFET_Energy_Manage
Test		Choose a Vehicle Test to Per...	FTP_Energy_Management	HFET_Energy_Management
Configuration		Vehicle Configuration	Vehicle: ; Motor: ; Ba...	Vehicle: ; Motor: ; Ba...
VEHICLE		Vehicle Submodel	...	...
TRANSMISSION		Transmission Submodel	...	...
ENGINE		Engine Submodel	...	...
EMACHINE		Electric Machine Submodel	...	...
BATTERY		Battery Submodel	...	...
ECU		ECU Submodel	...	...
TCU		TCU Submodel	...	...
BMS		BMS Submodel	...	...
DRIVER		Driver Submodel	...	...

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■ 定义 Case Setup(5/12)

● 新建对象

Template	Object Name
BatteryPack	BATTERY
BMS	BMS
Driver-Auto-CVT	DRIVER-AUTO-CVT
ECU	ECU
ElectricMachine	ELECTRICMACHINE
Engine	ENGINE
TCU-Auto	TCU-AUTO
Trans-Auto	TRANSMISSION-AUTO
Vehicle-FWD	VEHICLE-FWD

GT-DRIVE+

■ 定义 Case Setup(6/12)

● 定义参数

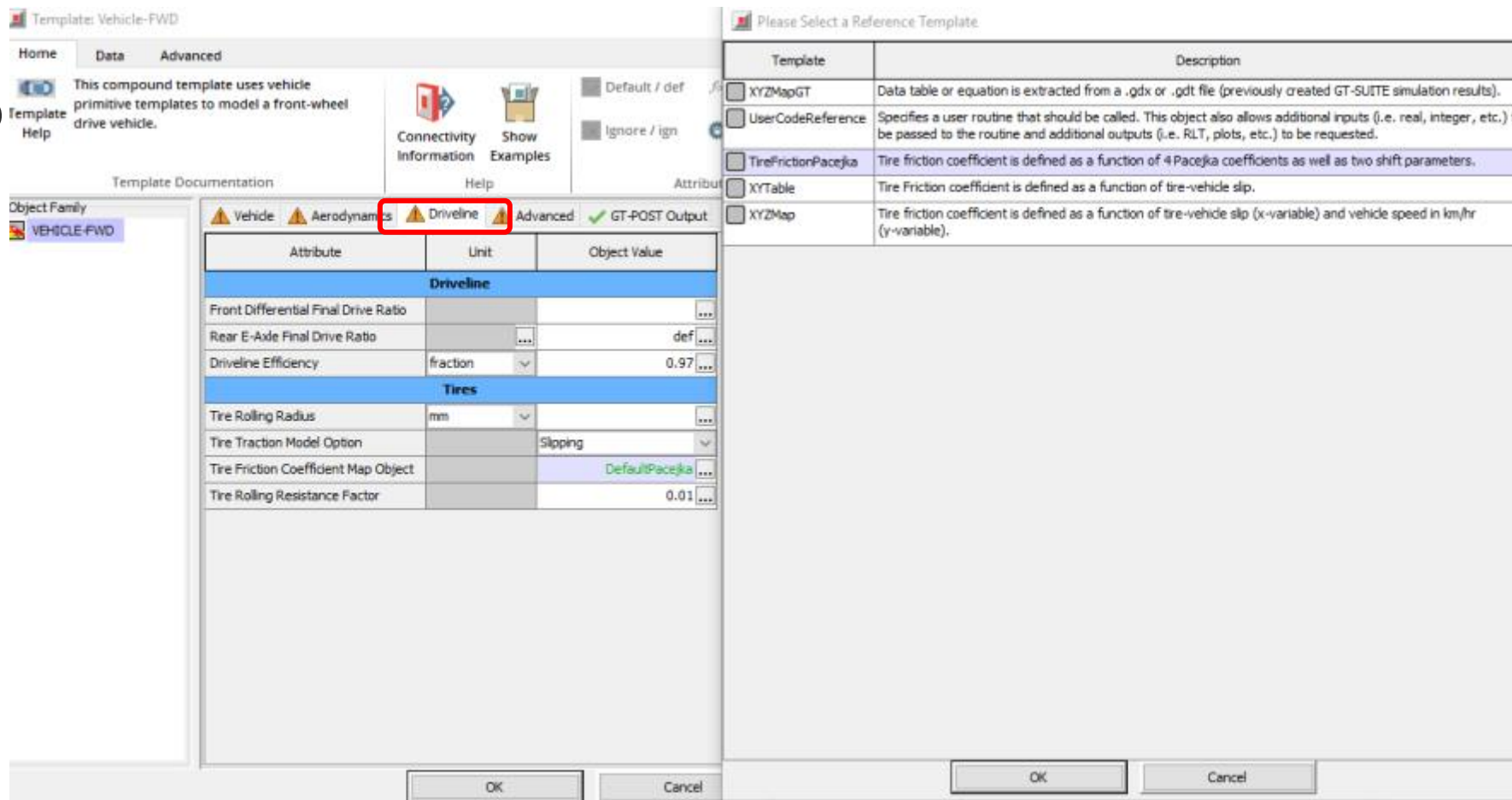
Object	Folder	Attribute	Object value (parameterized)	Destination Folder in Case Setup
BATTERY	Main	Initial State of Charge	Initial_SOC	Supervisory_Controls
DRIVER-AUTO-CVT	Analysis	Test Mode (1= Speed, 2= Accel, 3 = Imposed Conditions)	TestMode	Driver_Test
		Kinematic Solution Mode	KINEMSOLN	
		Driveline Inertia Option	STATICOPT	
	Advanced	Target Speed	TargetSpeed	Test
		Imposed Accelerator Pedal Position	ImposedAccelPedal	
		Imposed Brake Pedal Position	ImposedBrakePedal	
		Engine Speed Array	SpeedArray	Driver_Test
		Engine Accelerator Position Array	AccelArray	
		Lockup Clutch Actuator Position Override	LockupOverride	
		Shift Strategy Options Object	ShiftObject	
		Speed for Shift Schedule Output	OUTSPD	
		Shift Schedule Output File	ShiftFile	
		Control mode	MODE	Test

ENGINE	Advanced	Initial Speed - EngineState	Initial_EngineSpeed	Test
		Auxiliary Torque	Aux_Torque	
TRANSMISSION-AUTO	Torque Converter	Minimum Output Speed (Kinematic Simulations)	IdleSpeed	Driver_Test
	Advanced	Initial Gear Number	Initial_GearNumber	Test
		Initial Speed Passing	Speed_Flag	
		Condition (1 = Pass; 0 = Do not Pass)		
VEHICLE-FWD	Driveline	Tire Traction Model Option	ITMTYPE	Test
	Advanced	Initial Vehicle Speed	Initial_VehicleSpeed	Test
		Vehicle Speed(s) for "Time and Distance to Speed" RLTs	Performance_to_Speed	
		Vehicle Distance(s) for "Time and Speed to Distance" RLTs	Performance_to_Distance	
		Vehicle Speed to Halt Simulation	SimHault_Speed	
		Vehicle Distance to Halt Simulation	SimHault_Distance	
	Main	Gear Ratio	BAS_RATIO	Test
		Mechanical Efficiency	def (=1)	-

GT-DRIVE+

■ 定义 Case Setup(7/12)

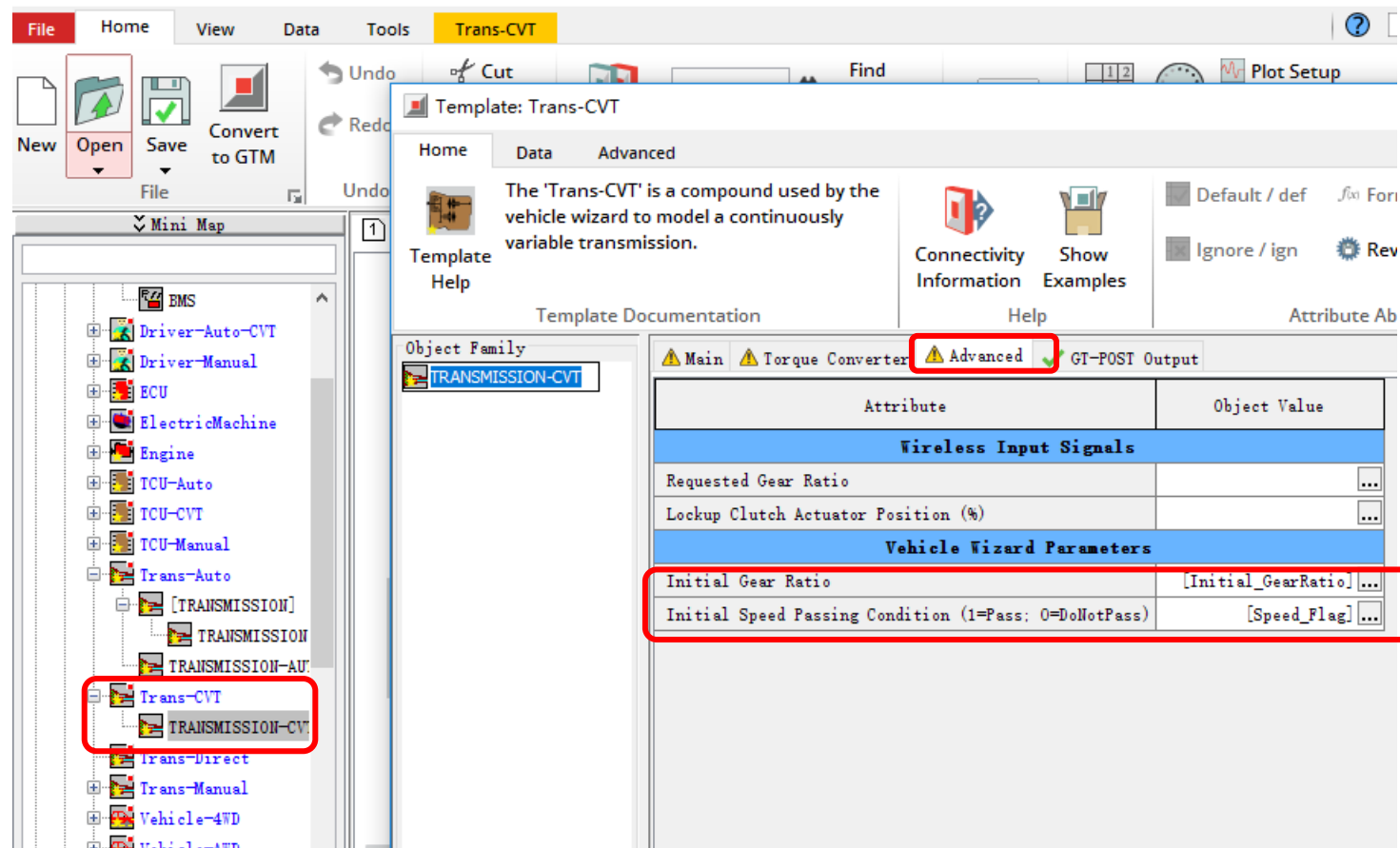
- 打开对象VEHICLE-FWD
- 设置轮胎摩擦系数



GT-DRIVE+

■ 定义 Case Setup(8/12)

- 定义一个变速器新对象
TRANSMISSION-CVT
- 并设置两个参数



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■ 定义 Case Setup(9/12)

- 在 Case Setup 中设置 test 和 Driver_Test 窗口中的参数值，可参考 Case Setup Data.xlsx

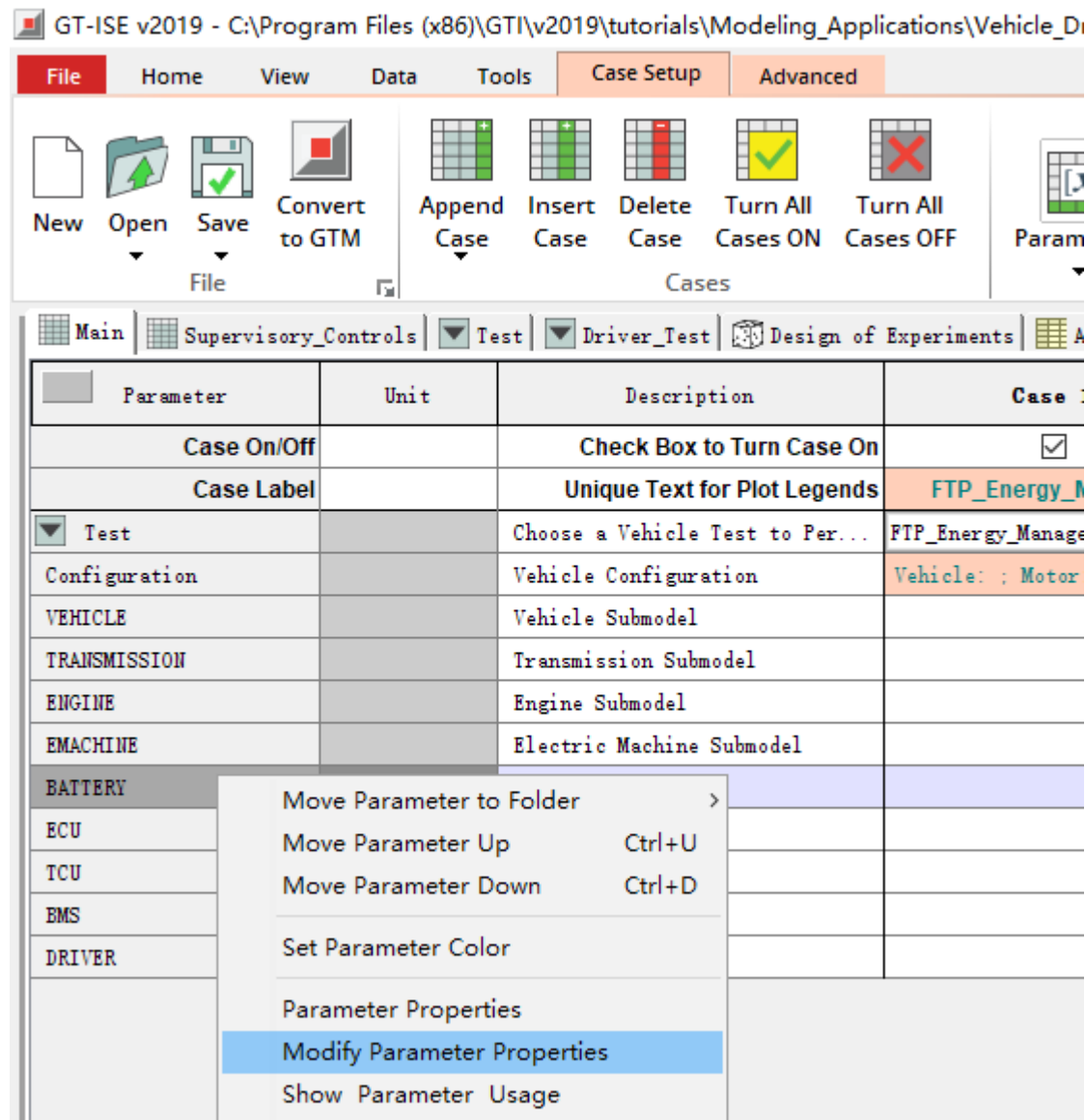
Main	Supervisory_Controls	Test	Driver_Test	Design of Experiments	All	
Dependent Parameters	Unit	Description	Option #1	Option #2	Option #3	
Option Values			FTP_Energy_Managem...	HFET_Energy_Manage...	NEI	
MODE		Control Mode	Brake Power	Brake Power	Brake	
Driver_Test			Dynamic_Closed_Loop	Dynamic_Closed_Loop	Dyns	
ITMTYPE		Tire Traction Model Option	Rigid	Rigid	Rigi	
TargetSpeed	km/h	Target Speed	FTP75_kph	HWY		
Simulation_Duration	s	Maximum Simulation Duration ...	1874	765		
ImposedAccelPedal	%	Imposed Accelerator Pedal Po...	ign	ign		
ImposedBrakePedal	%	Imposed Brake Pedal Position	ign	ign		
Initial_VehicleSpeed	km/h	Initial Vehicle Speed	0	0		
Initial_GearNumber		Initial Gear Number	1	1		
Initial_GearRatio		Initial Gear Ratio	3	3		
SimHault_Speed	km/h	Vehicle Speed to Halt Simula...	ign	ign		
SimHault_Distance	km	Vehicle Distance to Halt Sim...	ign	ign		
Performance_to_Speed	km/h	Vehicle Speed(s) for "Time a...	ign	ign		
Performance_to_Distance	km	Vehicle Distance(s) for "Tim...	ign	ign		
TimeStep		Maximum Integration Time Step	0.01	0.01		
Initial_EngineSpeed	RPM	Initial Engine Speed	1000	1000		
Aux_Torque	N-m	Engine Auxiliary Torque	0	0		
Speed_Flag		Initial Speed Passing Condit...	0	0		
BAS_RATIO		BAS to Engine Gear Ratio	def (=1)	def (=1)		

Main	Supervisory_Controls	Test	Driver_Test	Design of Experiments	All	
Dependent Parameters	Unit	Description	Option #1	Option #2	Option #3	
Option Values			Dynamic_Closed_Loop...	Dynamic_Open_Loop...	Dynamic_Mixed_Mo...	
TestMode		Test Mode (1=Speed, 2=Accel, 3=Imposed Pedals)	1	3	MixedMode	
KINEMSOLN		Kinematic Solution Mode	Off	Off	Off	
STATICOPT		Driveline Inertia Option	Use-Inertias	Use-Inertias	Use-Inertias	
IdleSpeed	RPM	Minimum Output Speed (Kinematic Simulations)	ign	ign	ign	
AccelArray	%	Engine Accelerator Position	ign	ign	ign	
SpeedArray	RPM	Engine Speed Array	ign	ign	ign	
ShiftObject		Shift Strategy Options Object	ign	ign	ign	
OUTSPD		Speed for Shift Schedule Output	Vehicle	Vehicle	Vehicle	
ShiftFile		Shift Schedule Output File	ign	ign	ign	
LockupOverride	%	Lockup Clutch Actuator Position Override	ign	ign	ign	

GT-DRIVE+

■ 定义 Case Setup(10/12)

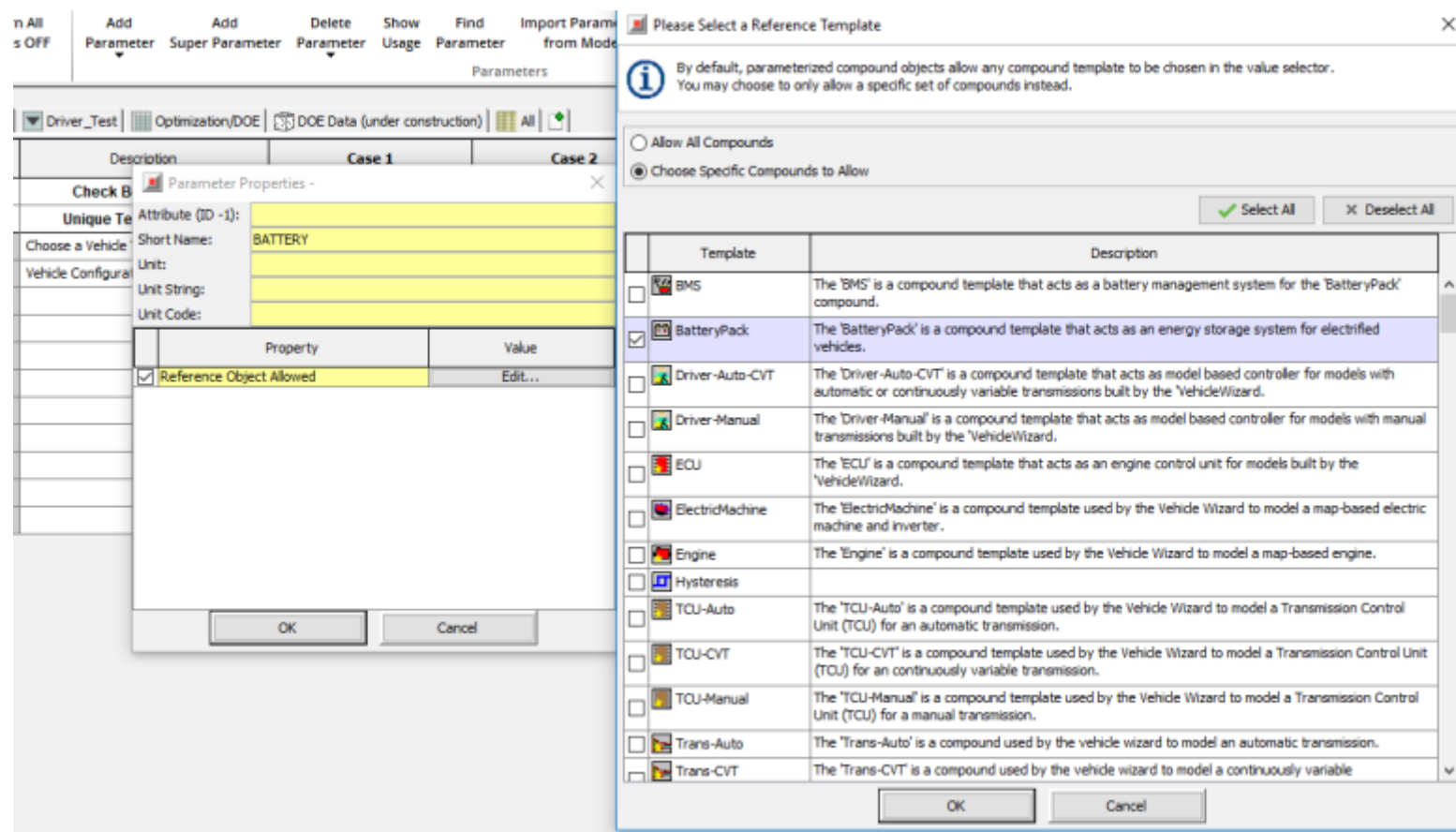
- 在main窗口中，右击 Battery 选择 Modify Parameter Properties，其目的在于将参数的选择范围限制在所定义的模板内



GT-DRIVE+

■ 定义 Case Setup(11/12)

- 点击 Edit, 只选择 BatteryPack, 并点击 OK



GT-DRIVE+

■ 定义 Case Setup(12/12)

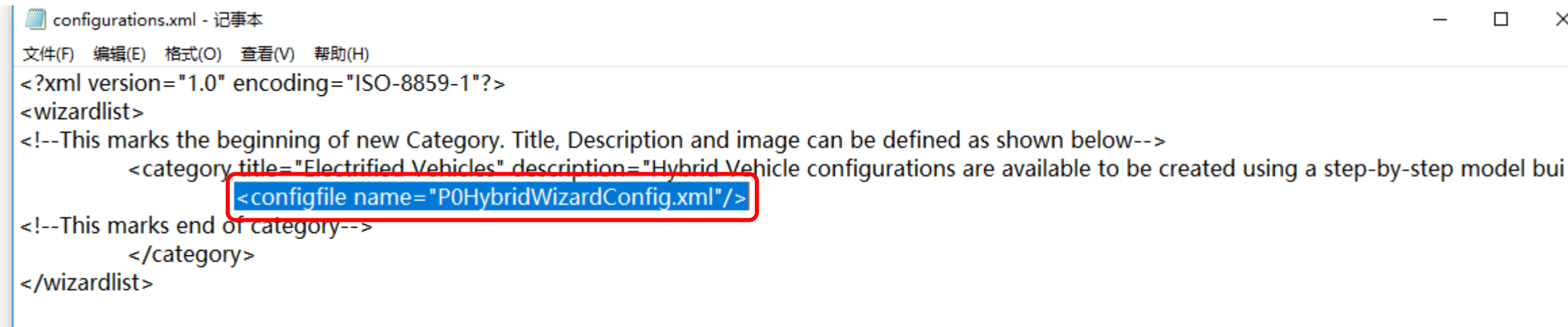
- 于 Battery 类似，修改其他参数的特性
- 到目前位置，就定义好了骨架模型(shell model)，保存模型

Parameter	Compounds to allow
BATTERY	BatteryPack
DRIVER	Driver-Auto-CVT
	Driver-Manual
ECU	ECU
EMACHINE	ElectricMachine
ENGINE	Engine
TCU	TCU-Auto
	TCU-CVT
	TCU-Manual
TRANSMISSION	Trans-Auto
	Trans-CVT
	Trans-Direct
	Trans-Manual
VEHICLE	Vehicle -4WD
	Vehicle -AWD
	Vehicle -FWD
	Vehicle -RWD
BMS	BMS

GT-DRIVE+

■ 设置配置文件(1/2)

- 打开目录中的 configuration.xml
- 在 configuration.xml 中加入一行命令，以连接 P0HybridWizardConfig.xml，关闭并保存



```
configurations.xml - 记事本
文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)
<?xml version="1.0" encoding="ISO-8859-1"?>
<wizardlist>
<!--This marks the beginning of new Category. Title, Description and image can be defined as shown below-->
    <category title="Electrified Vehicles" description="Hybrid Vehicle configurations are available to be created using a step-by-step model bui
        <configfile name="P0HybridWizardConfig.xml" />
<!--This marks end of category-->
    </category>
</wizardlist>
```

GT-DRIVE+

■ 设置配置文件(2/2)

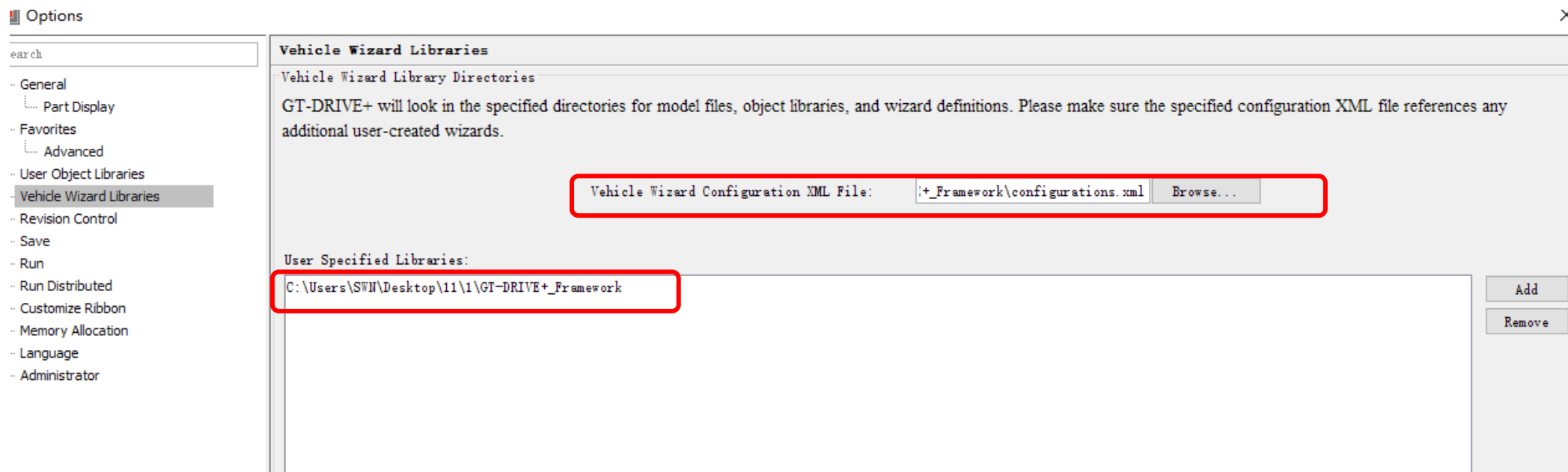
- 打开 P0HybridWizardConfig.xml , 将 gtmFile 名字改为之前保存的 .gtdrive 文件名, 关闭并保存

```
35  
36 </font>  
37 </html>  
38 "  
39 icon="vw_p0_intro_page.png"  
40 gtmFile="P0MildHybrid_Tutorial.gtdrive"  
41 gtoFile="VehicleData.gto">  
42 <!--This marks the beginning of new chapter. Progress  
43 <chapter progressImage="vw_p0_vehicle.png" title="Dri  
44 <!--This marks the beginning of new Part. Part Name c  
45 be skipped by selecting None. User needs to select fr  
46 be linked for Template help and Object Help by specif  
47 <part
```

GT-DRIVE+

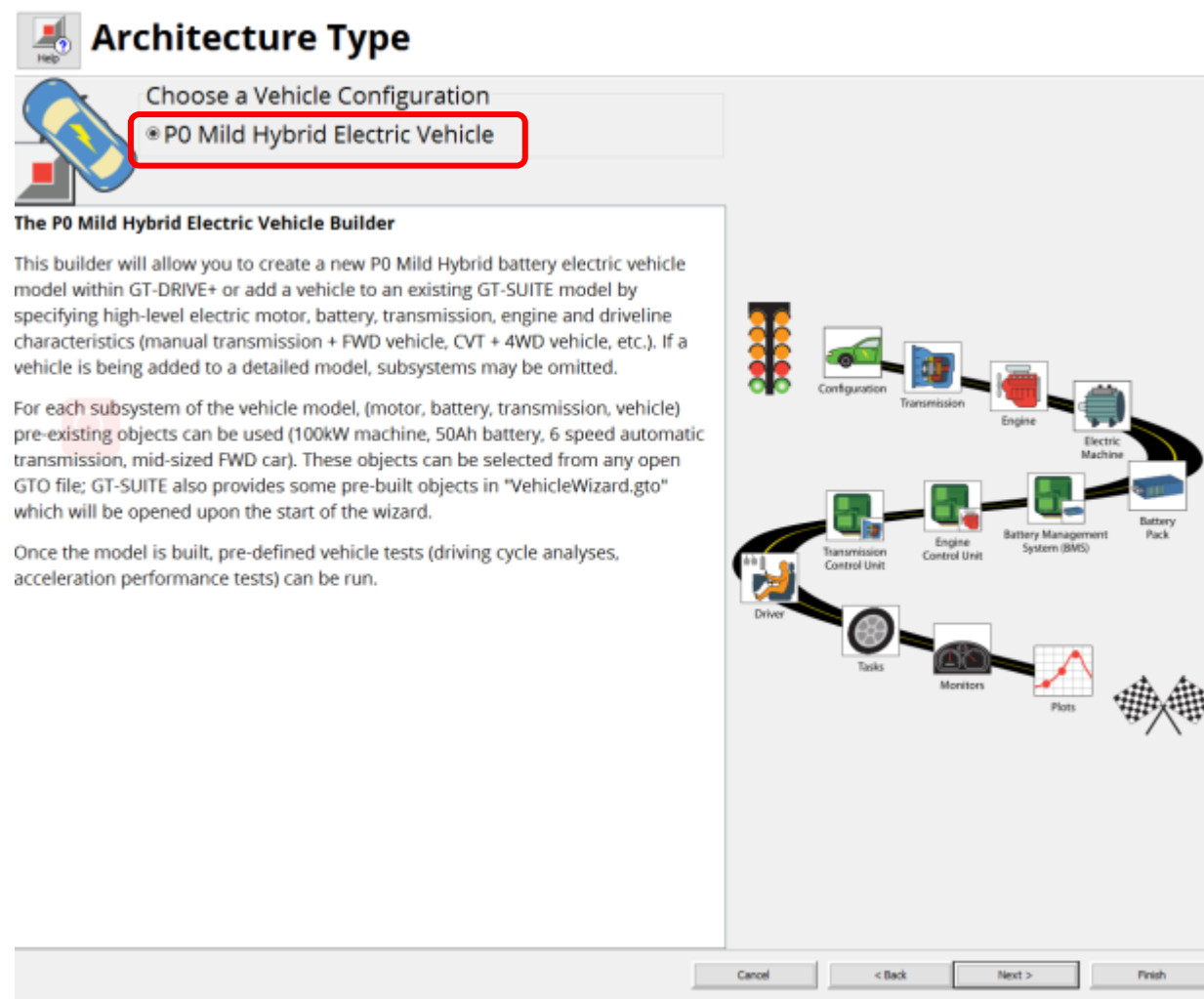
■ 定义整车向导库

- 打开 File->Options->Vehicle Wizard Libraries
- 选择 configuration.xml, 并添加所在目录, 点击 OK



GT-DRIVE+

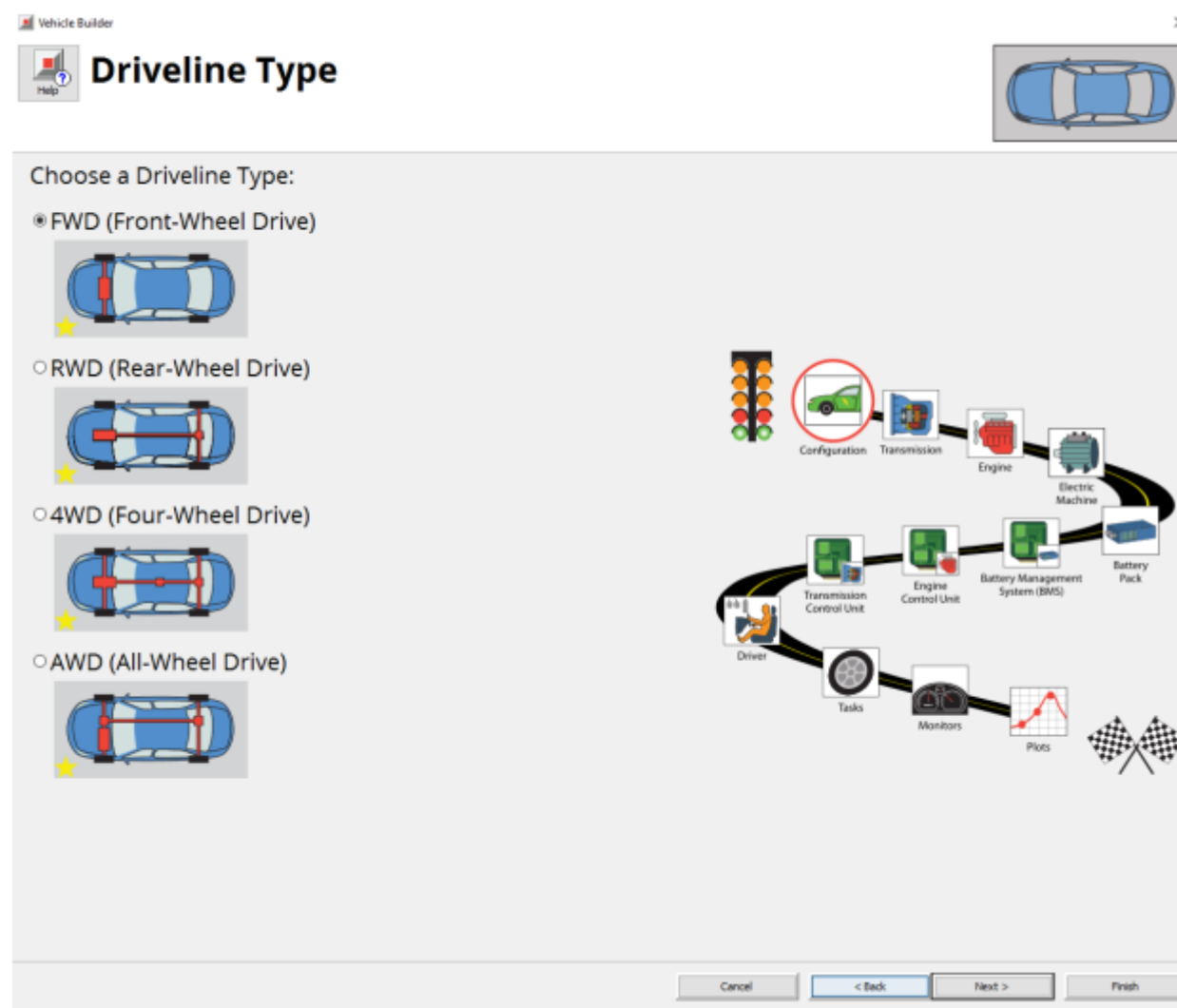
- 通过向导建立 P0 整车模型(1/3)
- 新建一个 GT-DRIVER+, 窗口中出现之前所定义的轻混模板 P0
- 点击 Next



GT-DRIVE+

■ 通过向导建立 P0 整车模型(2/3)

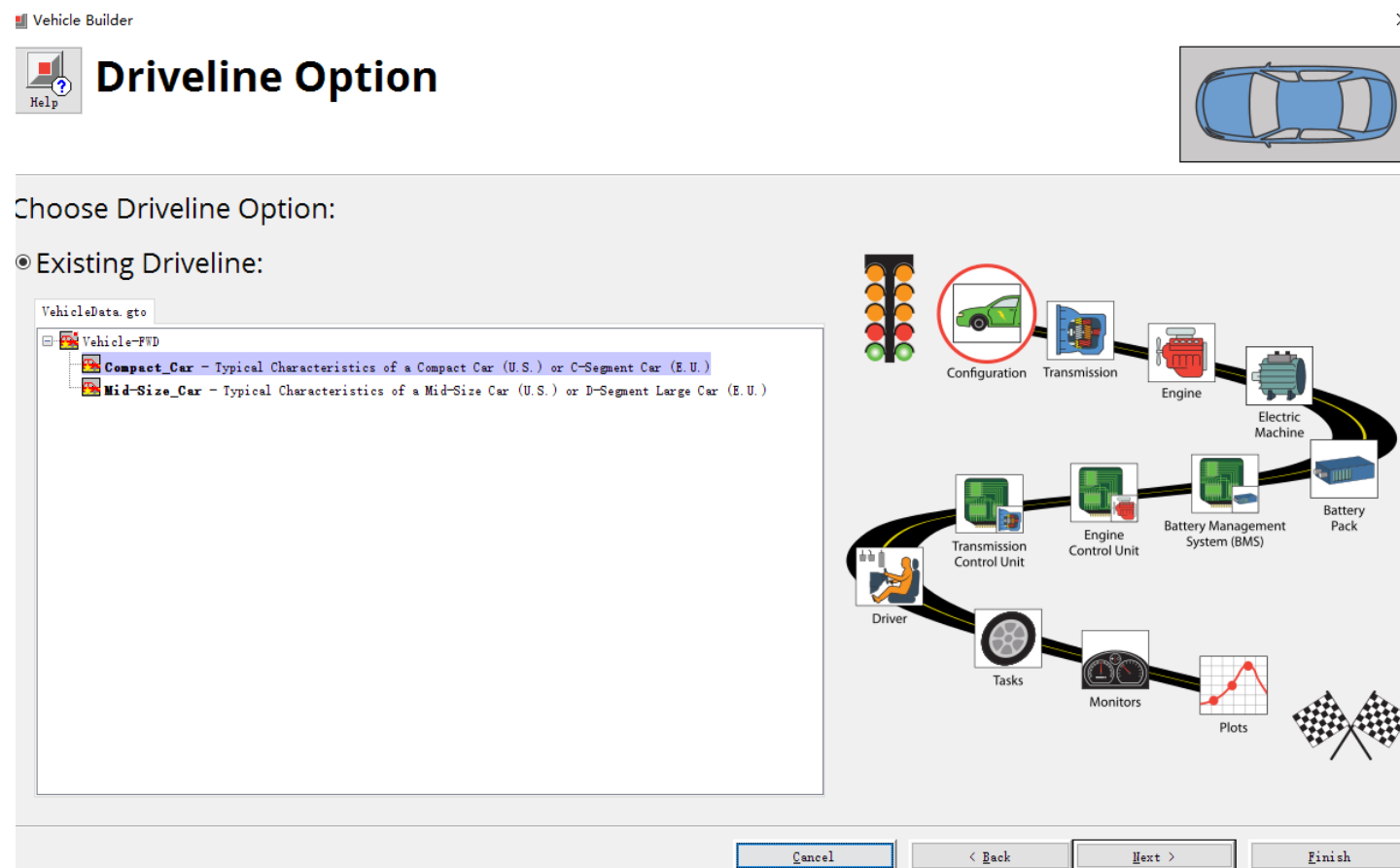
- 选择动力总成的形式
- 点击 Next



GT-DRIVE+

■ 通过向导建立 P0 整车模型(3/3)

- 选择动力总成选项，每一个都代表一组已经预先定义好的模板
- 依次定义 Transmission -> Engine-> ElectricMachine....->Plots，最后点击 finish，模型完成



感谢倾听
期待与您的进一步合作 😊



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获得第一手下载资讯

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- Tel: 021-50588290; 010-65881497