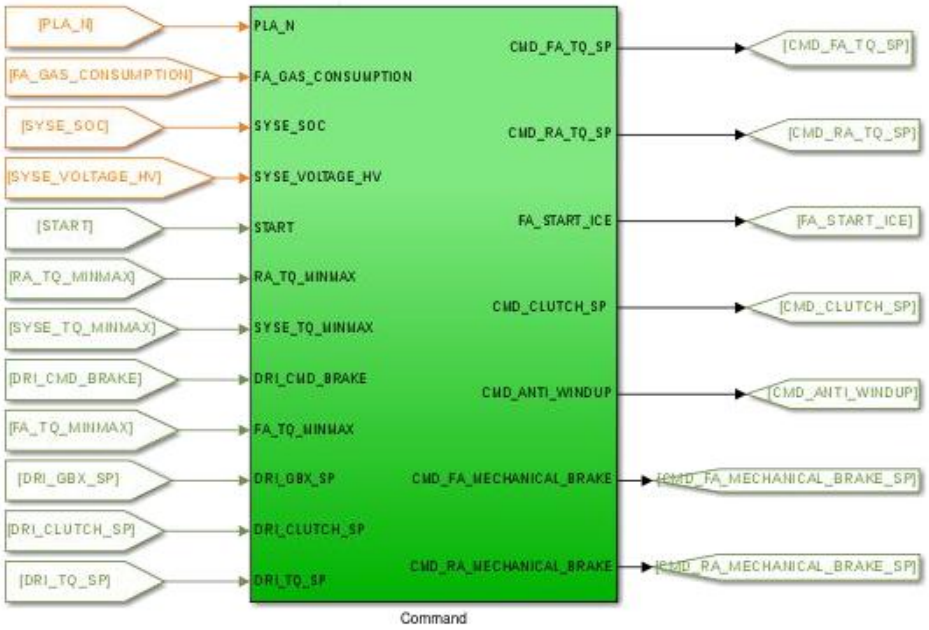
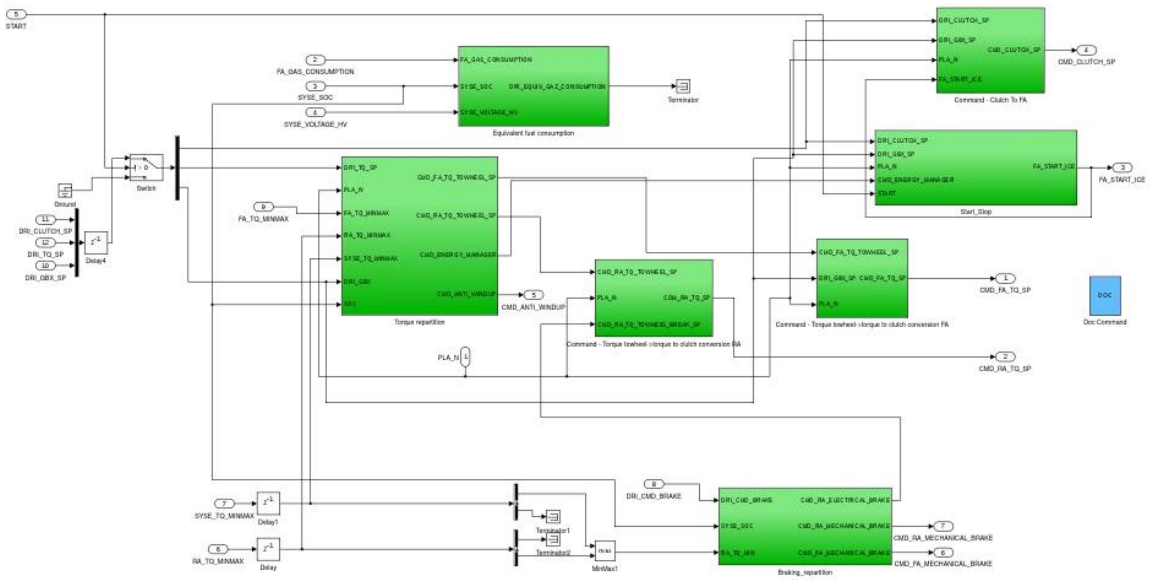
Command model

1 System description

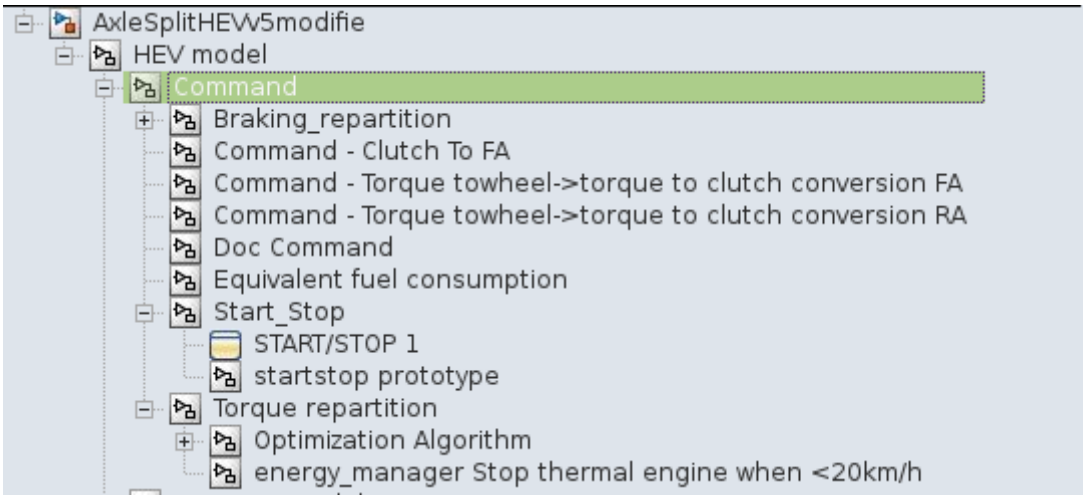
Model of the supervision. This model main goal is to convert and dispatch the torque command.



2 System organization



Model browser



3 Signals and parameters

Inputs

Name	Description	Note
PLA_N	Wheel speed	In RPM
RA_TQ_MINMAX	Minimum and maximum torque of the electrical machine	Normalized torque “to wheel”, two signal: - RA_TQ_MIN - RA_TQ_MAX
SYSE_TQ_MINMAX	Minimum and maximum torque for the electrical system	Normalized torque “to wheel”, two signal: - SYSE_TQ_MIN - SYSE_TQ_MAX
FA_TQ_MINMAX	Minimum and maximum torque for the ICE	Normalized torque “to wheel”, two signal: - FA_TQ_MIN - FA_TQ_MAX
DRI_CLUTCH_SP	Clutch pedal value	Range [0, 1]
DRI_GBX_SP	Gearbox engaged gear	For a manual gearbox
FA_GAS_CONSUMPTION	Instantaneous gas consumption	-
SYSE_SOC	Li-Ion battery state of charge	Range [0,1]
SYSE_VOLTAGE_HV	Voltage on the HV network	-
DRI_TQ_SP	Torque request from the driver	-
FA_START	Command variable to start the ICE from the driver	Binary
DRI_CMD_BRAKE	Command variable to brake	Normalized torque “to wheel” in N.m (positive)

Outputs

Name	Description	Note	Destination
CMD_FA_TQ_SP	Torque set point for the ICE	N.m	Front axle
CMD_RA_TQ_SP	Torque set point for the electrical machine	N.m	Rear axle
FA_START_ICE	Command to start the ICE	-	Front axle
CMD_CLUTCH_SP	Clutch command	-	Front axle
CMD_ANTI_WINDUP	Anti-windup command		Driver
CMD_FA_MECHANICAL_BRAKE_SP	Torque set point of mechanical brake of front axle	N.m (positive)	Front axle
CMD_RA_MECHANICAL_BRAKE_SP	Torque set point of mechanical brake of rear axle	N.m (positive)	Rear axle

Parameters

Native

Name	Type	Unit	Description	Source	Linked to
cmd_equivalent_conso_coef	var	-	Coefficient for equivalent fuel consumption	Continental	
cmd_qmax	var	Ah	Maximum charge	Continental	
cmd_specific_volume_l_per_g	var	l/g	Gasspecific volume	Continental	
cmd_torque_repartition	var	-	Coefficient for torque repartition	BEI N7 2014	

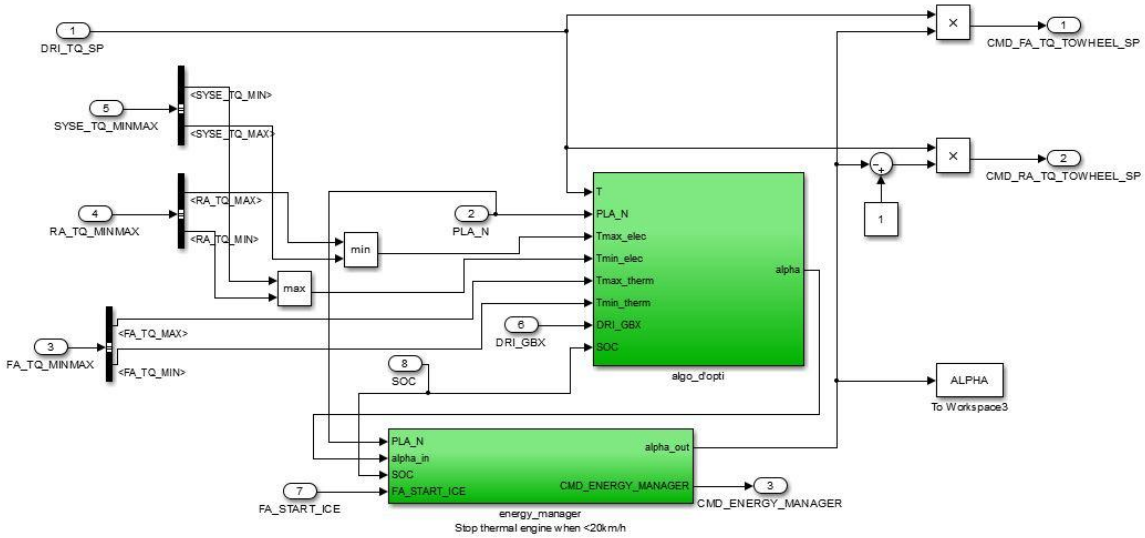
Inherited

Name	Type	Unit	Description
fa_gearbox_efficiency	var	-	Gearbox efficiency
fa_differential_ratio	var	-	Front axledifferential ratio
fa_gearbox_ratio	vector	-	Gearbox ratio table
pla_max_f_brakes	var	N	Brakes maximum force
ra_differential_ratio	var	-	Rear axle differential ratio
ra_transmission_efficiency	var	-	Rear axle differential efficiency

4 Subsystems description

Torque repartition

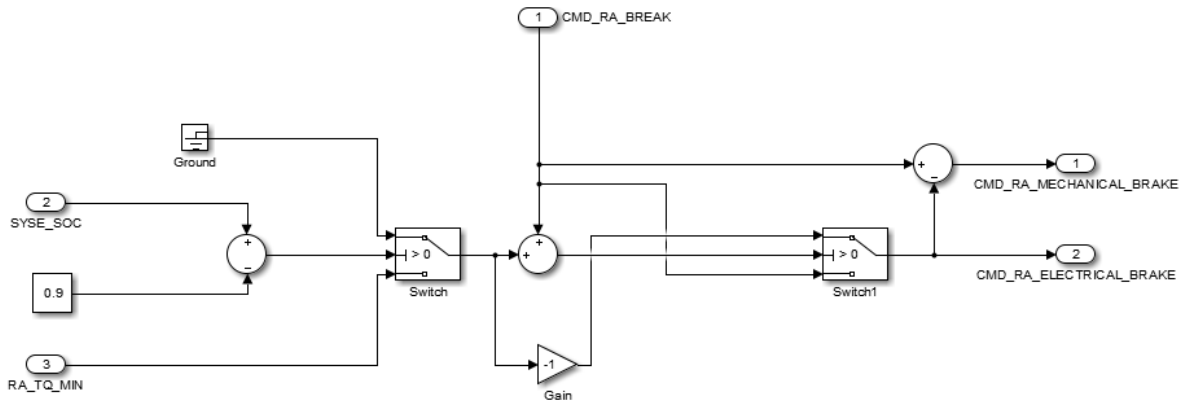
Repartition of the toque between the two axle and the brakes, with saturation applied.



- Optimization algorithm: Calculates the torque repartition coefficient.
- Energy manager: Stops thermal engine under 20 Km/h.

Braking repartition

Brake of rear axle distribution between electrical braking and mechanical braking.

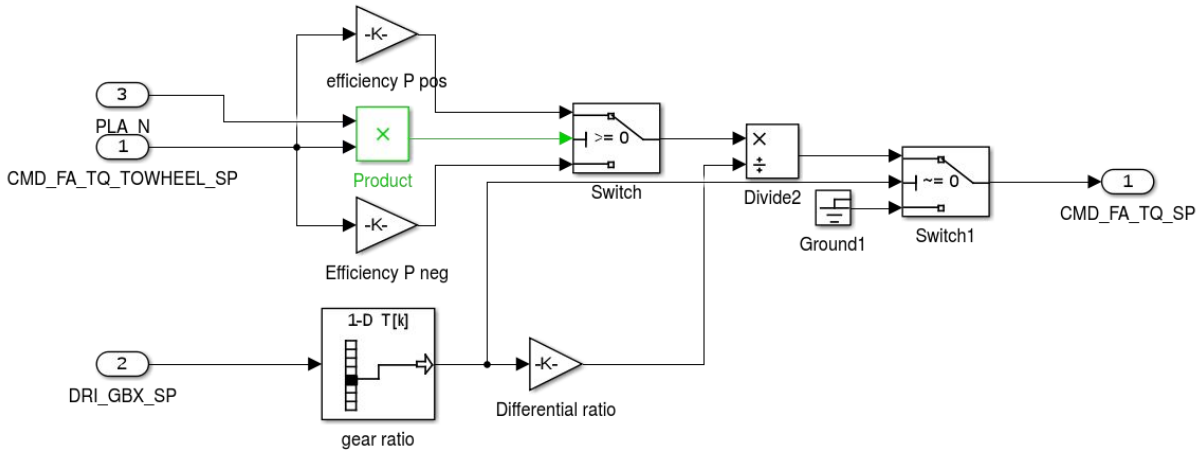


Note:

This brake repartition is designed for a decoupled brake pedal technology.

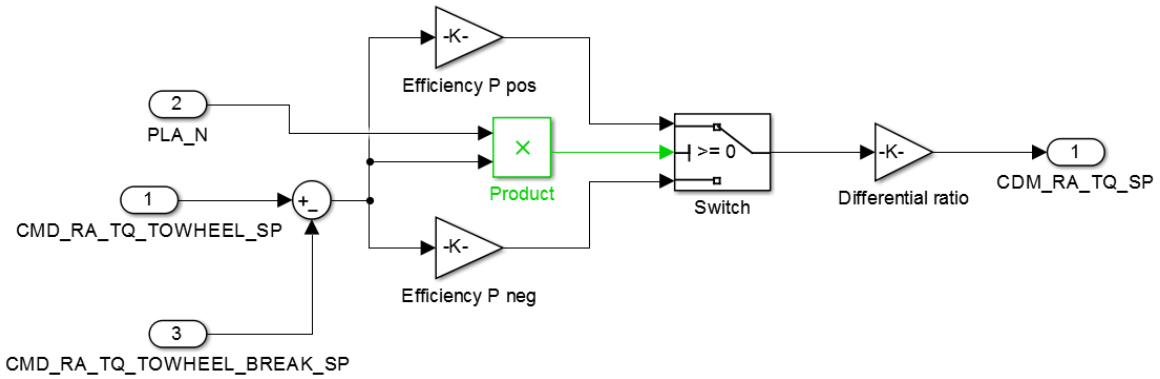
Command- torque to wheel-> torque to clutch conversion FA

Conversion of torque value at the wheel to combustion engine (ICE)



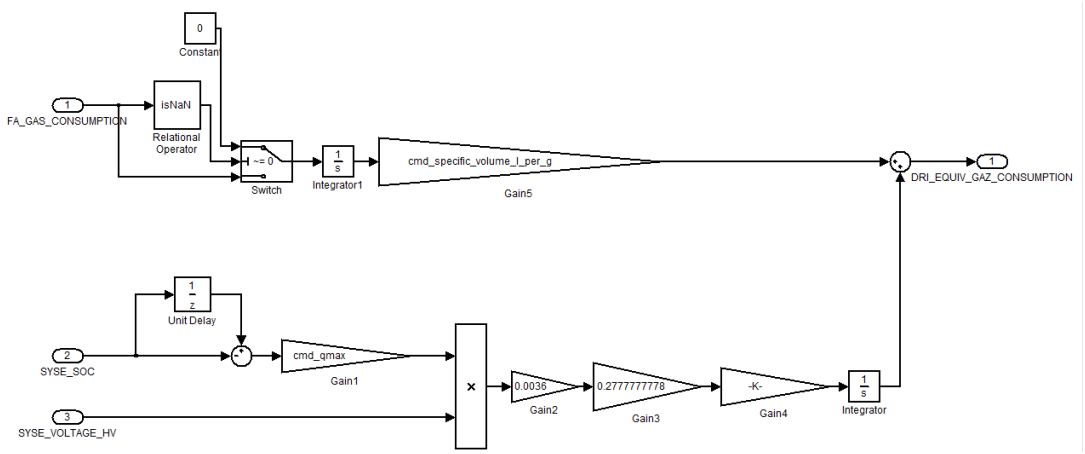
Command- torque to wheel-> torque to clutch conversion RA

Conversion of torque value to the wheel to electric motor.



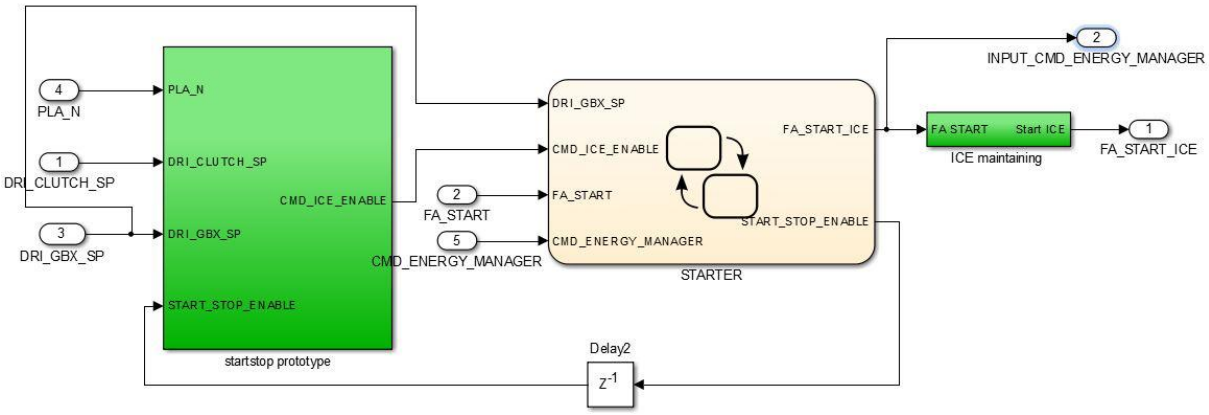
Equivalent fuel consumption

Equivalent fuel consumption following the standard. Used to optimize the torque repartition.



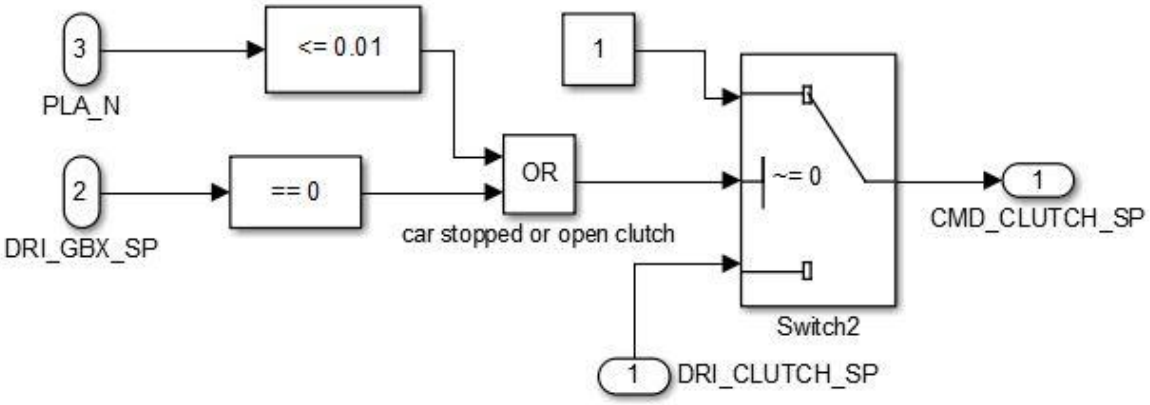
Start&stop prototype

Disables the ICE in low speeds and when GBX = 0.



- Start Stop prototype: Design of the start and stop logic.
- STARTER: Synchronizes the Start/Stop with the Energy manager, and in the first start of the ICE.
- ICE maintaining: avoids short stops of the ICE.

Clutch Command:



Imposes a clutch stuck when GBX = 0 or the speed is low.