



Model-Based Design of Mechatronic Systems

Ing. Milan Kertész, PhD.
Ing. Jozef Sakson

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Agenda

- 1 Technological Transition of Schaeffler
- 2 Mechatronic Development in Schaeffler
- 3 Mechatronic Powertrain Systems
- 4 Model-Based Design in System Development
- 5 Model-Based Design in Software Development

Technological Transition of Schaeffler

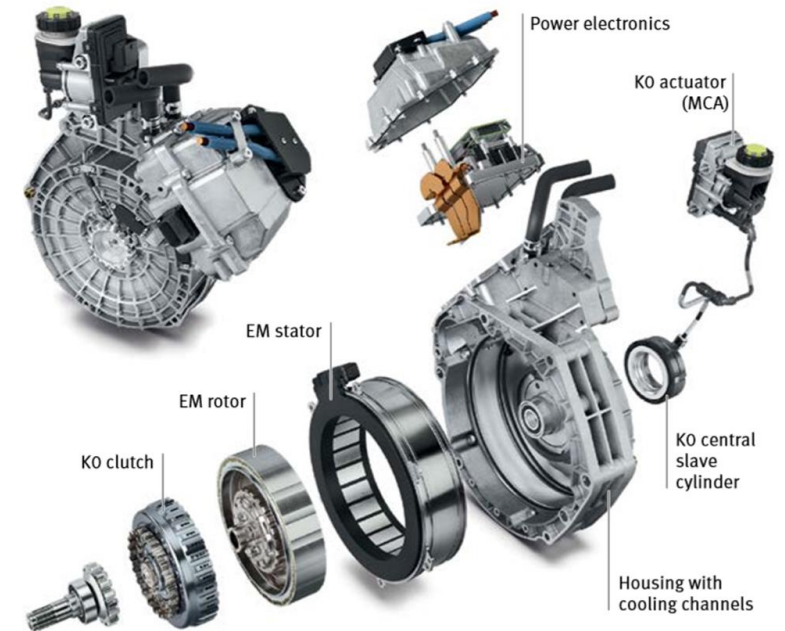
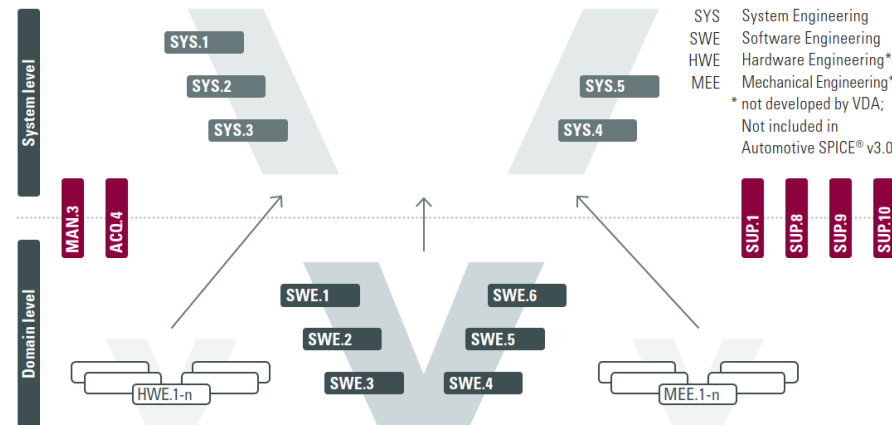
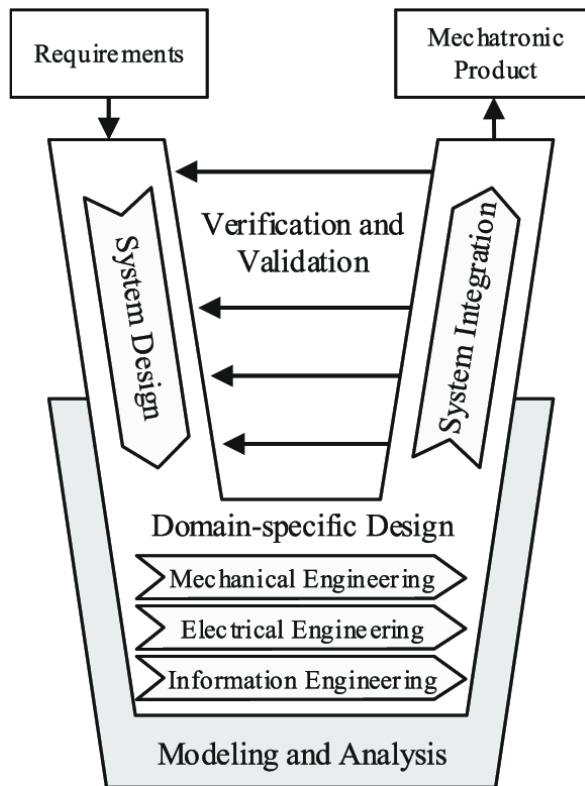
Technological transition of Schaeffler portfolio can be described in three dimensions:

1. Simple to Complex products
2. Mechanical to Mechatronic products
3. Components to Systems



Mechatronic Development in Schaeffler

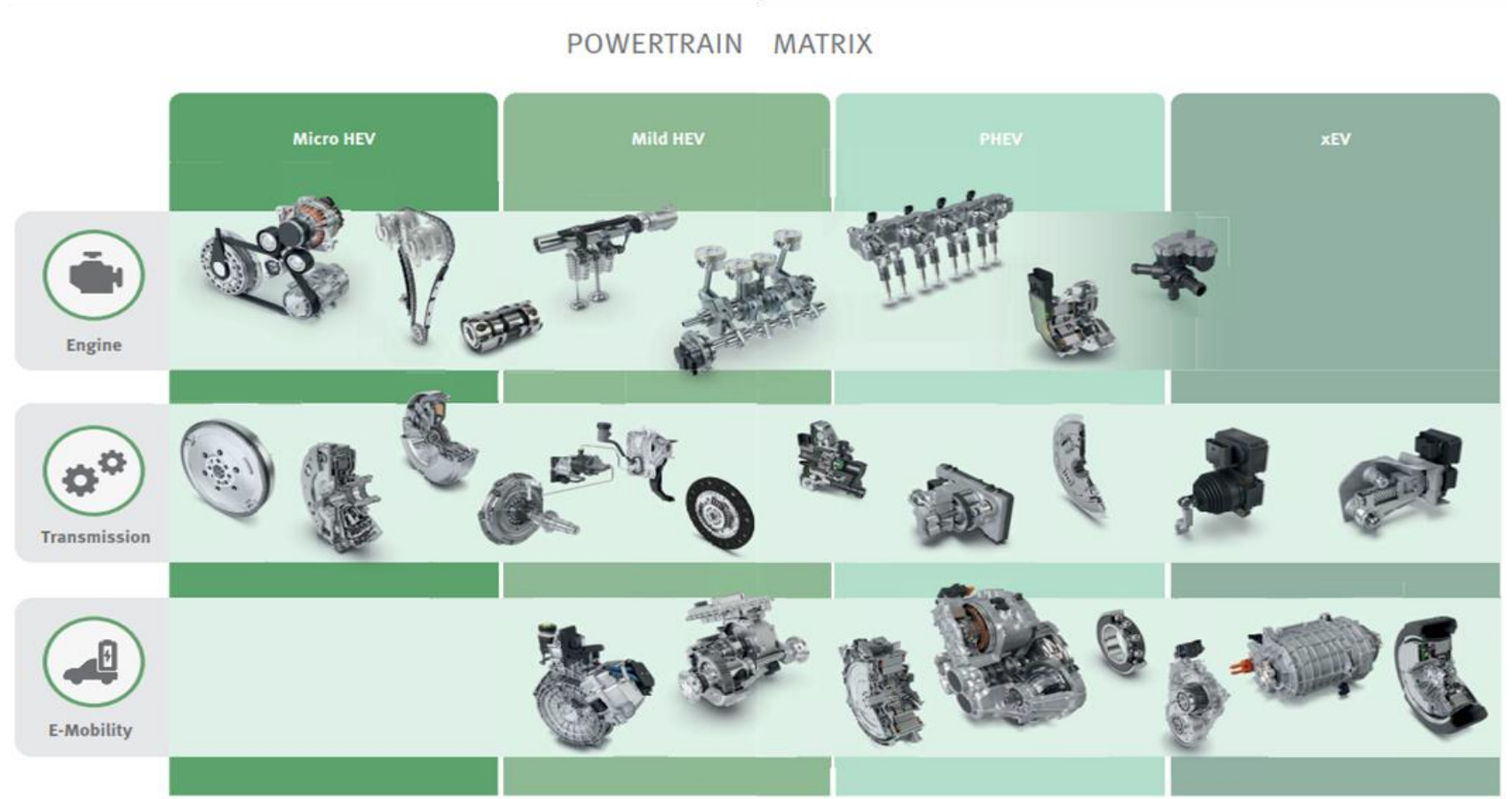
V-Cycle as a spine of systems development



Mechatronic Powertrain Systems

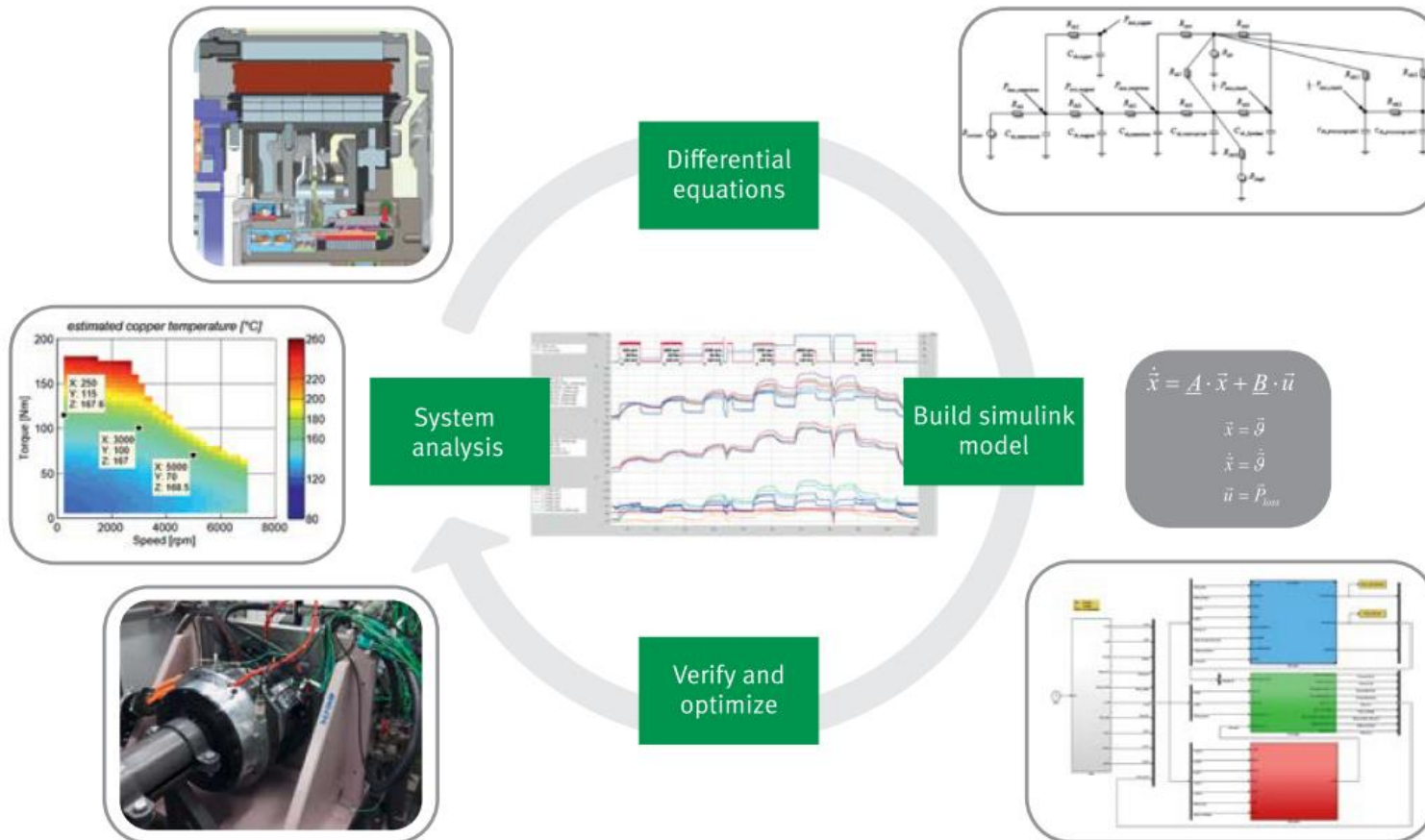
Several elements of vehicles are within the interest of our development in Schaeffler:

- Chassis
- Engines
- **Transmissions**
- **Electric drives**



5 The Schaeffler powertrain matrix – solutions for all powertrain concepts

Model-Based Design in System Development



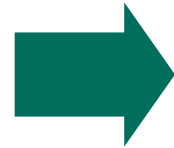
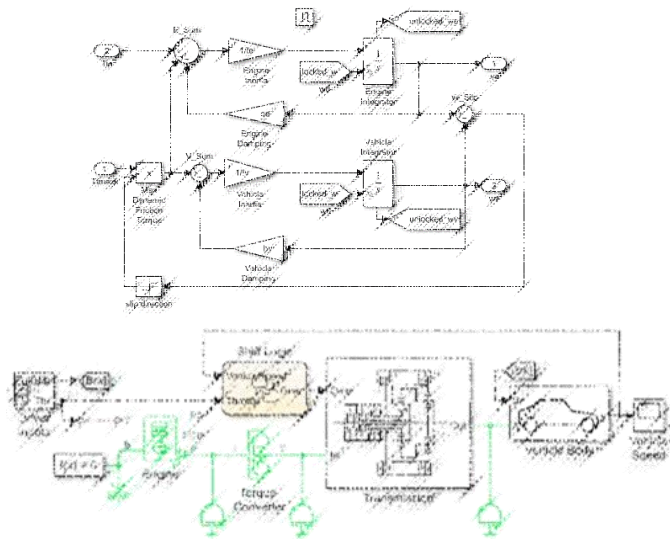
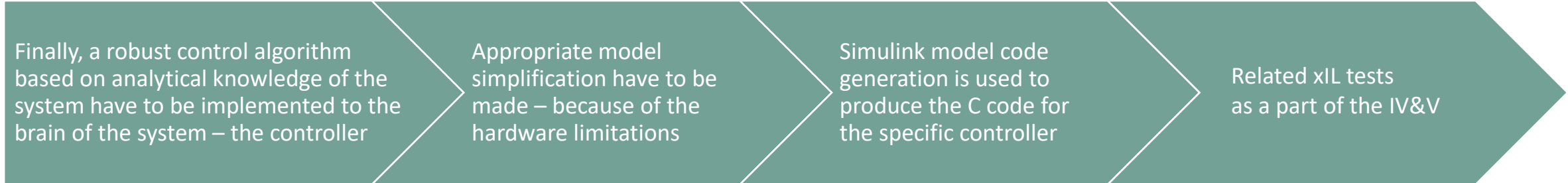
The aim is to create a mathematical model of a mechatronic system that allows us to design complex control algorithms with a prediction for:

- Electric motors
- Power electronics
- Clutches
- Cooling systems
- Electro-hydraulic actuators
- Electro-mechanical actuators etc.

Domain-wise, various effects have to be treated:

- Mechanical wear
- Thermal influence
- Hydraulic effects etc.

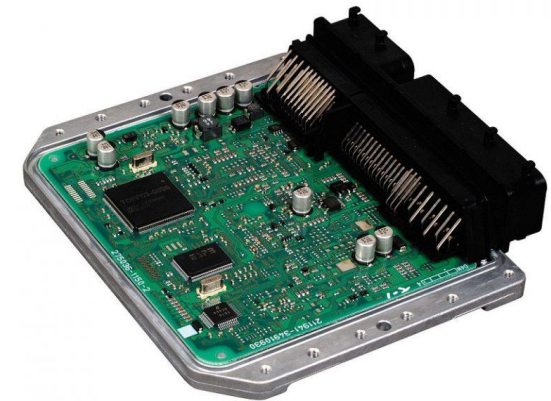
Model-Based Design in Software Development



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81
82 two_wheels_MOT_atonic_DW.TriggeredFastSubsystem_PREV_I =
83 two_wheels_MOT_atonic_M>Timing.clockTickBy)
84 two_wheels_MOT_atonic_DW.TriggeredFastSubsystem_RESEY_EL = false;
85
86 // DiscreteIntegrator: '5512/Discrete-Time Integrator' //
87 IF (two_wheels_MOT_atonic_DW.DiscreteTimeIntegrator1_SYSTEM_B == 0) {
88 two_wheels_MOT_atonic_DW.DiscreteTimeIntegrator1_STATE = 0.0002 * (real_I);
89 TriggeredFastSubsystem_ELAPS_I
90 * two_wheels_MOT_atonic_DW.DiscreteTimeIntegrator1_PREV_I;
91
92 }
93
94 // top of DiscreteIntegrator: '5512/Discrete-Time Integrator' //
95
96 // DiscreteIntegrator: '5512/Discrete-Time Integrator' //
97 IF (two_wheels_MOT_atonic_DW.DiscreteTimeIntegrator1_SYSTEM == 0) {
98 two_wheels_MOT_atonic_DW.DiscreteTimeIntegrator1_STATE = 0.0002 * (real_I);
99 TriggeredFastSubsystem_ELAPS_I
100 * two_wheels_MOT_atonic_DW.DiscreteTimeIntegrator1_PREV_I;
101
102 }
103 // End of DiscreteIntegrator: '5512/Discrete-Time Integrator' //

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Thank You!