MODEL-BASED DESIGN TOOLBOX (MBDT)

Edit, simulate, compile and deploy designs with MATLAB® for computation-intensive applications. The NXP® Model-Based Design Toolbox (MBDT) is a comprehensive collection of tools that plug into the MATLAB and Simulink® model-based design environment to support fast prototyping, verification and validation for real targets based on NXP microcontrollers.

The NXP MBDT includes an integrated Simulink-embedded target supporting NXP MCUs for direct rapid prototyping and built-in support for software- and processor-in-the- loop (SIL and PIL) development workflows, systems and peripherals device interface blocks and drivers, a target-optimized Math and Motor Control library set (AMMCLib) for efficient execution on the target automotive MCUs and Real-Time Control Embedded Software Motor Control and Power Conversion Libraries (RTCESL) for other MCUs, and bit-accurate simulation results in the Simulink simulation environment.

The NXP MBDT helps to generate all the code required automatically (including initialization routines and device drivers) to start up the MCU and run complex applications such as motor control algorithms and sensor-based and communication protocols while supporting builds with multiple compilers. The NXP MBDT supports a wide range of applications development and helps enable control engineers and embedded developers to shorten project life cycles.

The NXP MBDT generates all the code required to start up the MCU and run the application code, while supporting builds with multiple compilers.

The NXP MBDT includes:

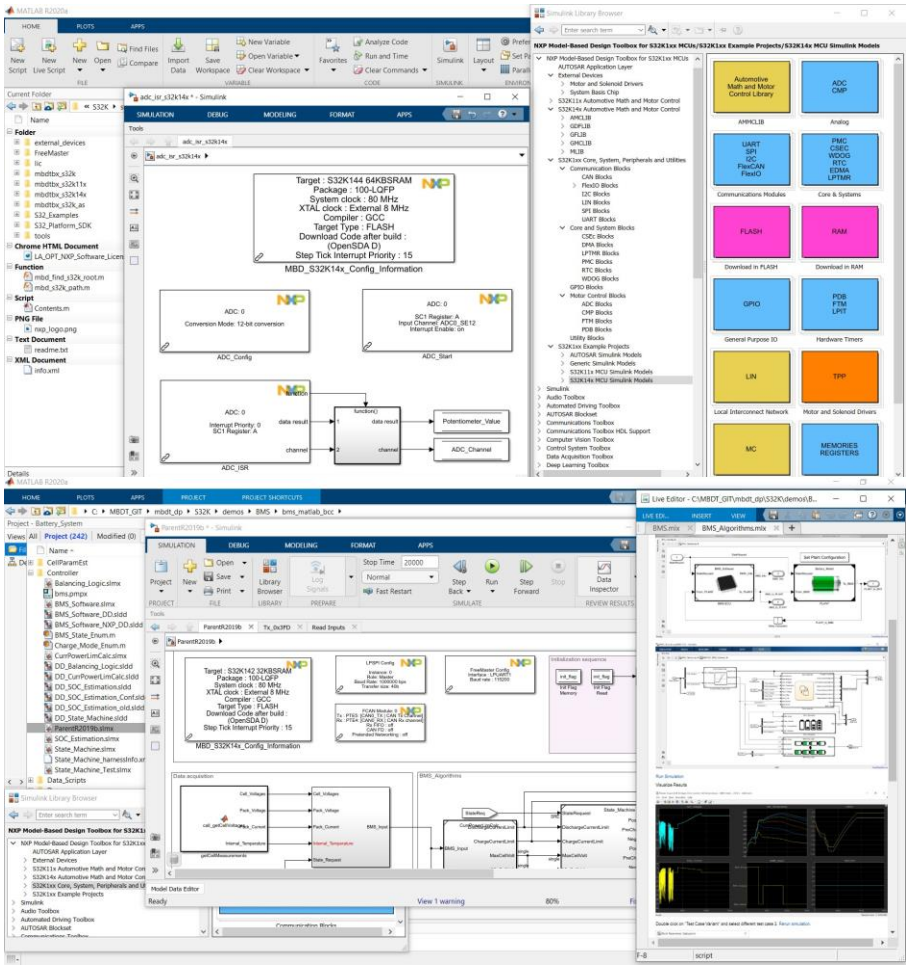
- Integrated Simulink-embedded target supporting NXP MCUs for direct rapid prototyping and PIL workflows
- Systems and peripherals device interface blocks and drivers
- Target-optimized math and motor control algorithm blocks for efficient execution on the target MCU
- Bit-accurate simulation results in the Simulink simulation environment

TARGET APPLICATIONS

- Embedded system development
- Industrial automation
- Automotive control design
- Machinery real-time systems
- Aerospace and defense

FEATURES

- Built-in support for direct code download to the target MCU through the RAppID Boot Loader utility
- Out-of-the-box applications for a wide set of MCU peripherals
- Complete cost-free build toolchain for embedded applications
- Built-in support for NXP FreeMASTER - a real-time debug monitor and data visualization tool interface. It provides visibility into the target MCU for algorithm calibration and tuning, making it suitable for advanced control systems and those required by motor control development, with:
  - Monitor signals in real time on the embedded target
  - Data logging
  - Signal capture
  - Parameter tuning



PRODUCT REQUIREMENTS

MATLAB

Simulink

Embedded coder

MATLAB coder

Simulink coder

SUPPORTED NXP MICROCONTROLLERS/DRIVER BLOCKS

*Earlier released products only support 32-bit

	CORE & SYSTEMS				COMMUNICATIONS						MEDIA		MOTOR CONTROL					UTILITIES	EXTERNAL DEVICES	SIMULATION MODES
	GPIO	Timers	ISR	DMA	CAN	SPI	I²C	UART	FlexIO	ENET	Audio	Video	ADC	PWM	PDB	CTU	GDU			
S32K1xx	Y	Y	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y			FreeMASTER AMMCLib	UJA113x, UJA116x, MC33GD3000, MC34GD3000, MC33937,MC34937, MC3377xB, MC33664	SIL, PIL, External Mode, AUTOSAR SW-C
S32K3xx	Y	Y	Y		Y	Y		Y					Y	Y		Y		FreeMASTER AMMCLib	MC33775A, MC33664	SIL, PIL, External Mode, AUTOSAR SW-C
S32G2																				SIL, PIL
S32R41																				SIL, PIL
MPC57xx: MPC57Bx MPC57Cx MPC57Gx MPC57Px	Y	Y	Y	Y	Y	Y	Y	Y					Y	Y		Y		FreeMASTER AMMCLib	MC33GD3000, MC34GD3000, MC33937,MC34937	SIL, PIL AUTOSAR SW-C
MPC56xx: MPC56Lx MPC56Kx	Y	Y	Y	Y	Y	Y	Y	Y					Y	Y		Y		AMMCLib		SIL, PIL
MPC576xF	Y																			PIL AUTOSAR SW-C
MC5681XX	Y	Y	Y	Y	Y	Y							Y	Y				FreeMASTER RTCESL		SIL, PIL
MC56F83XX	Y	Y	Y	Y	Y	Y							Y	Y				FreeMASTER RTCESL		SIL, PIL
S12 MagniV®	Y	Y	Y		Y	Y	Y	Y					Y	Y			Y	RTCESL		SIL, PIL
i.MX RT101x	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y		Y	Y				FreeMASTER RTCESL		SIL, PIL
i.MX RT106x	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y				FreeMASTER RTCESL		SIL, PIL, External Mode
i.MX RT117x	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y				FreeMASTER RTCESL		SIL, PIL, External Mode
Kinetis KV3x/4x/5x	Y	Y	Y		Y	Y	Y	Y	Y				Y	Y	Y			FreeMASTER RTCESL		SIL, PIL, External Mode

AUTOMOTIVE MATH AND MOTOR CONTROL LIBRARIES (AMMCLIB)

Embedded Software and Motor Control Libraries

GENERAL TRIGONOMETRIC AND BASIC FUNCTIONS (GFLIB)
Trigonometric functions
Limitation functions
PI controller functions
Linear interpolation
Hysteresis function
Signal integration function
Sign function
Signal ramp function
GENERAL MOTOR CONTROL FUNCTIONS (GMCLIB)
Clark transformation
Park transformation
Duty cycle calculation
Elimination of DC ripples
Decoupling of PMSM motors
GENERAL DIGITAL FILTERS FUNCTIONS (GDFLIB)
Finite impulse filter
Moving average filter
First order infinite impulse filter
Second order infinite impulse filter
MATHEMATICAL FUNCTION LIBRARY (MLIB)
Absolute value
Add
Convert
Divide
Multiply, multiple accumulate, multiply-subtract, multiply-subtract-from
Negative
Normalize
Shift, bit shift
Subtract
Vector multiply accumulate

REAL-TIME CONTROL EMBEDDED SOFTWARE MOTOR CONTROL AND POWER CONVERSION LIBRARIES (RTCESL)

ALGORITHM (16 AND 32-BIT FIXED POINT, 32-BIT FLOATING POINT)
Absolute value
Negation
Conversion
Conversion with rounding
Addition
Leading-bit count
Subtraction
Single-bit Shift
Multi-bit Shift
Mutli-bib bidirectional shift
Mutliplication
Mutliplication with negation
Mutliplication with rounding
Mutliplication with negation and rounding
Multiplication-accumulation
Multiplication-negation-accumulation
Multiplication-subtraction
Multiplication-negation-accumulation with rounding
Multiplication-accumulation with rounding
Multiplication-subtraction with rounding
Division (single quadrant)
Signed division
Reciprocal (single-quadrant)
Signed reciprocal
Sign
Binary logarithm
Saturation
Sum of four addends
Subtraction of 3 subtrahends from the minuend

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