



**Industrial
Summit 2021**
Shenzhen, China
POWERING YOUR INNOVATION



X-CUBE-MCSDK Update

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Agenda

1 STM32 for Motor Control

5 Q&A

2 X-CUBE-MCSDK Update

3 X-CUBE-MCSDK 5.Y.3 Demo

4 Highlights on X-CUBE-MCSDK

STM32 for Motor Control

COUPLING CONTROL & POWER BOARD

Control Board



MC Connector

Power Board

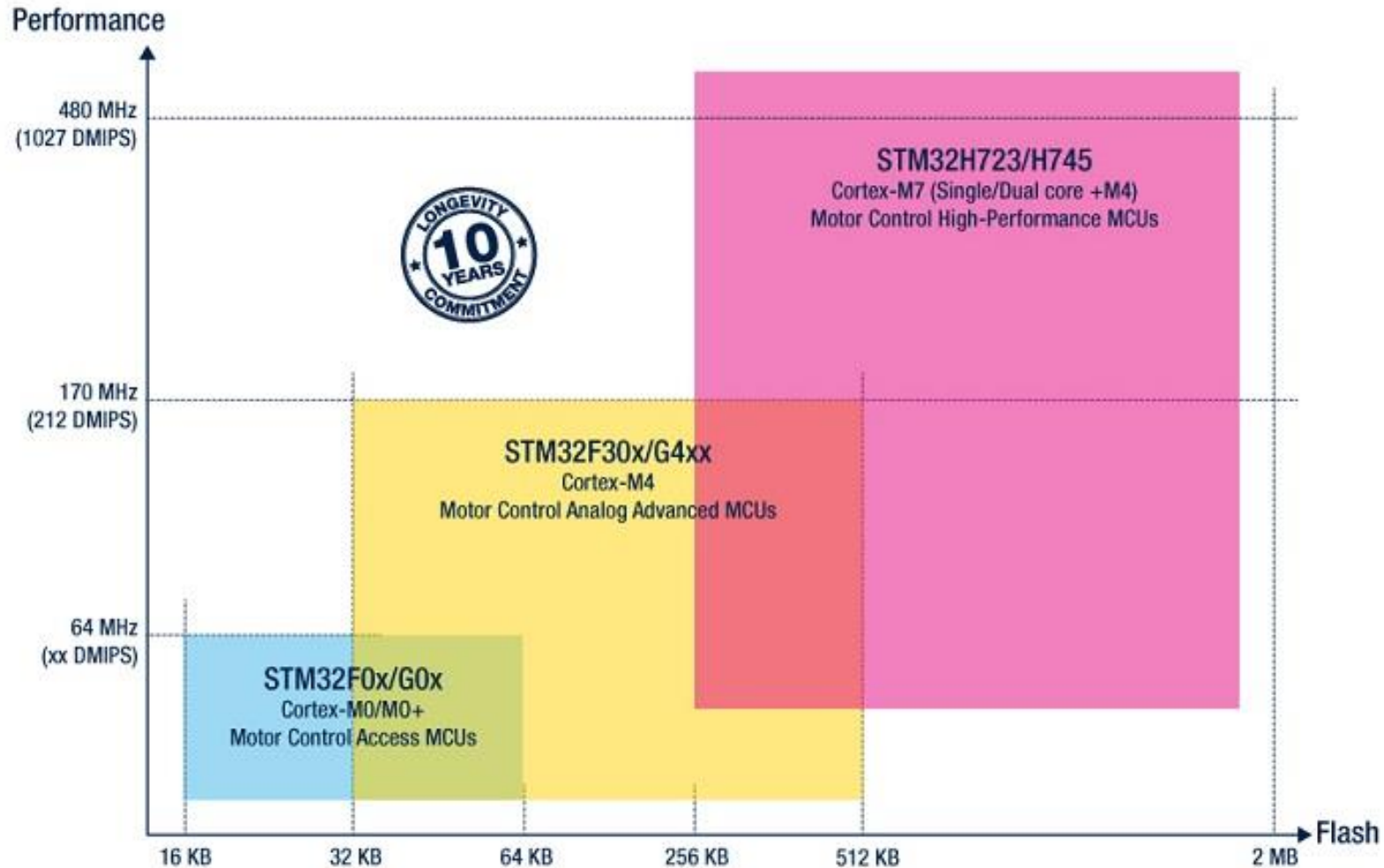


All our boards are listed in the **ST-MC-SUITE** tool



life.augmented

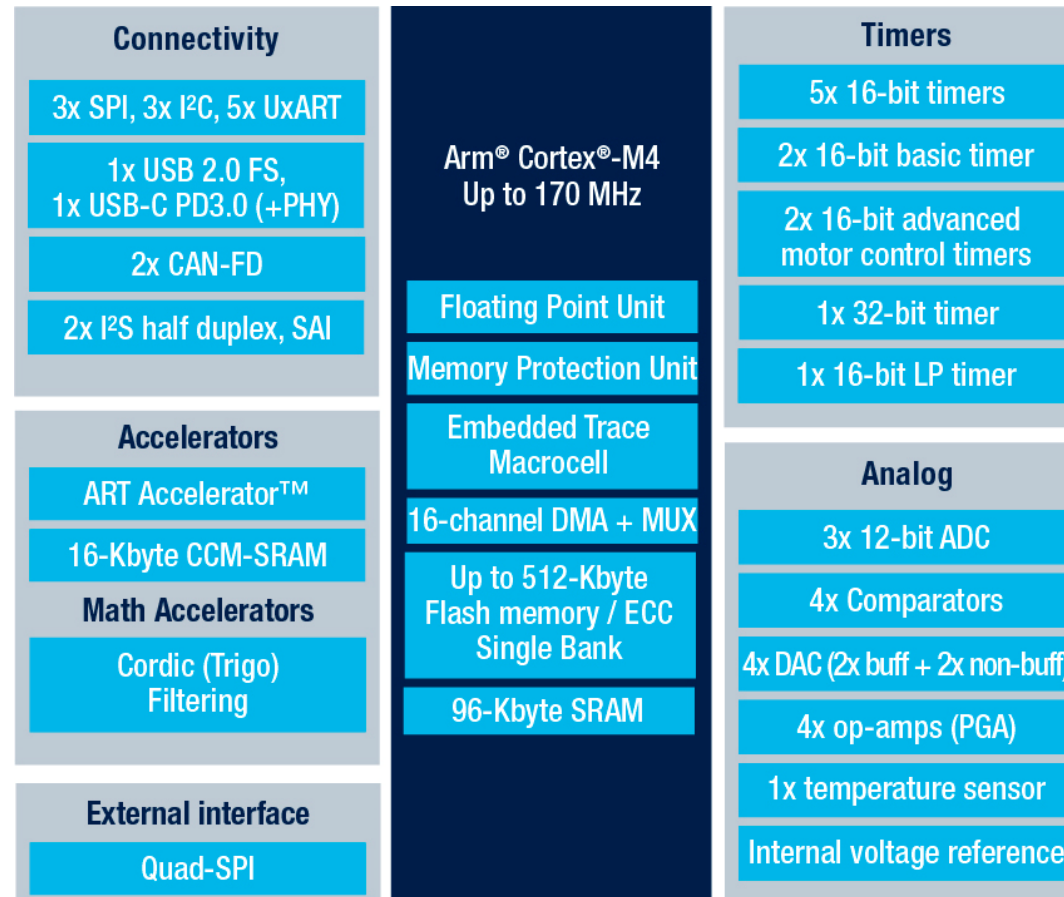
STM32 for Motor Control



STM32G491 Block Diagram

Access line [32KB .. 512KB]

- 32-bit Arm Cortex-M4 core with FPU
- ART + CCM-SRAM + Mathematic Accelerators
- Single Bank Flash with ECC
- SRAM with Parity bit
- +/- 1% internal clock
- 1.72 to 3.6V power supply
- Up to 125°C



- Advanced Motor Control timers
- Rich Advanced Analog
- CAN Flexible Data rate
- USB-C Power Delivery3.0
- Advanced Security and Safety features
- Robustness: highest level 5 / FTB/ESD - IEC 61000-4-4

STM32 G0 Value Line-STM32G030

- 32-bit Arm Cortex-M0+ core
- 2.0 to 3.6V power supply
- RAM maximization
- 1% internal clock
- Direct Memory Access (DMA)
- Communication peripherals

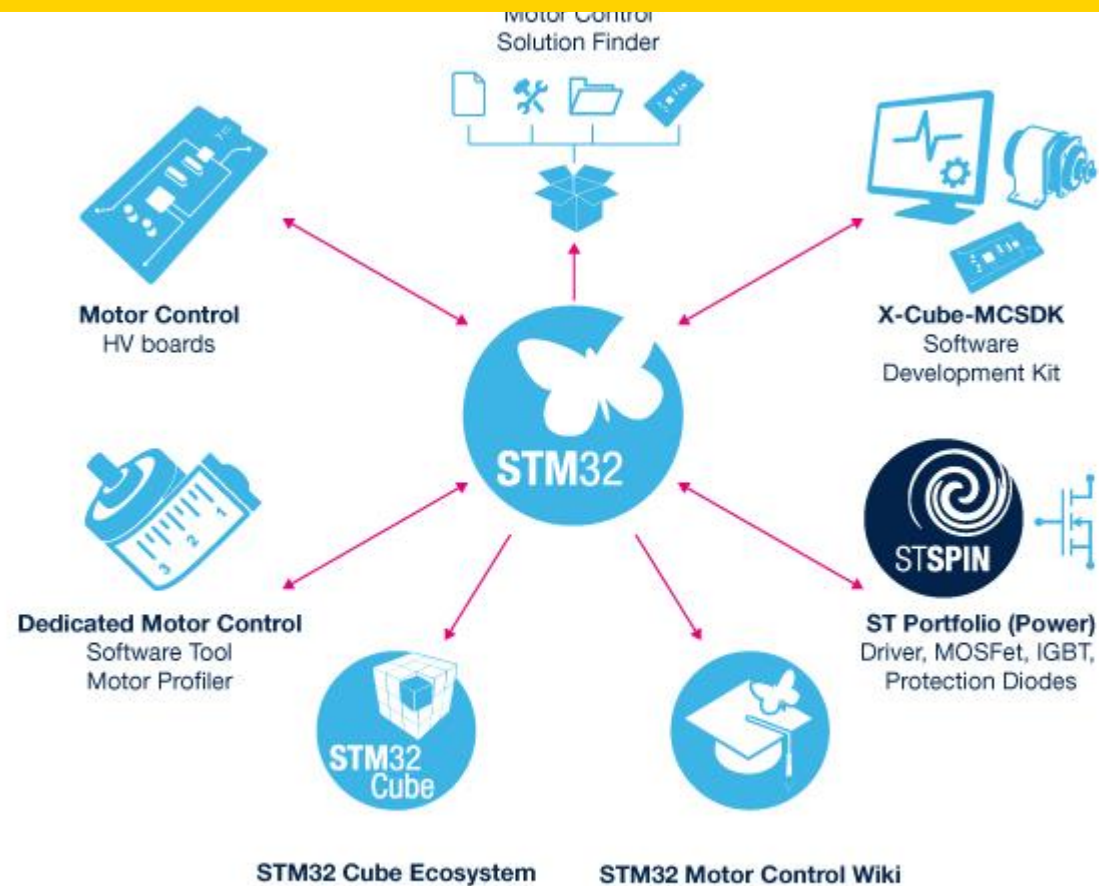


- Timers
- Real-time Clock
- I/O ports maximization
- 12-bit Ultra-fast ADC
- Safety features

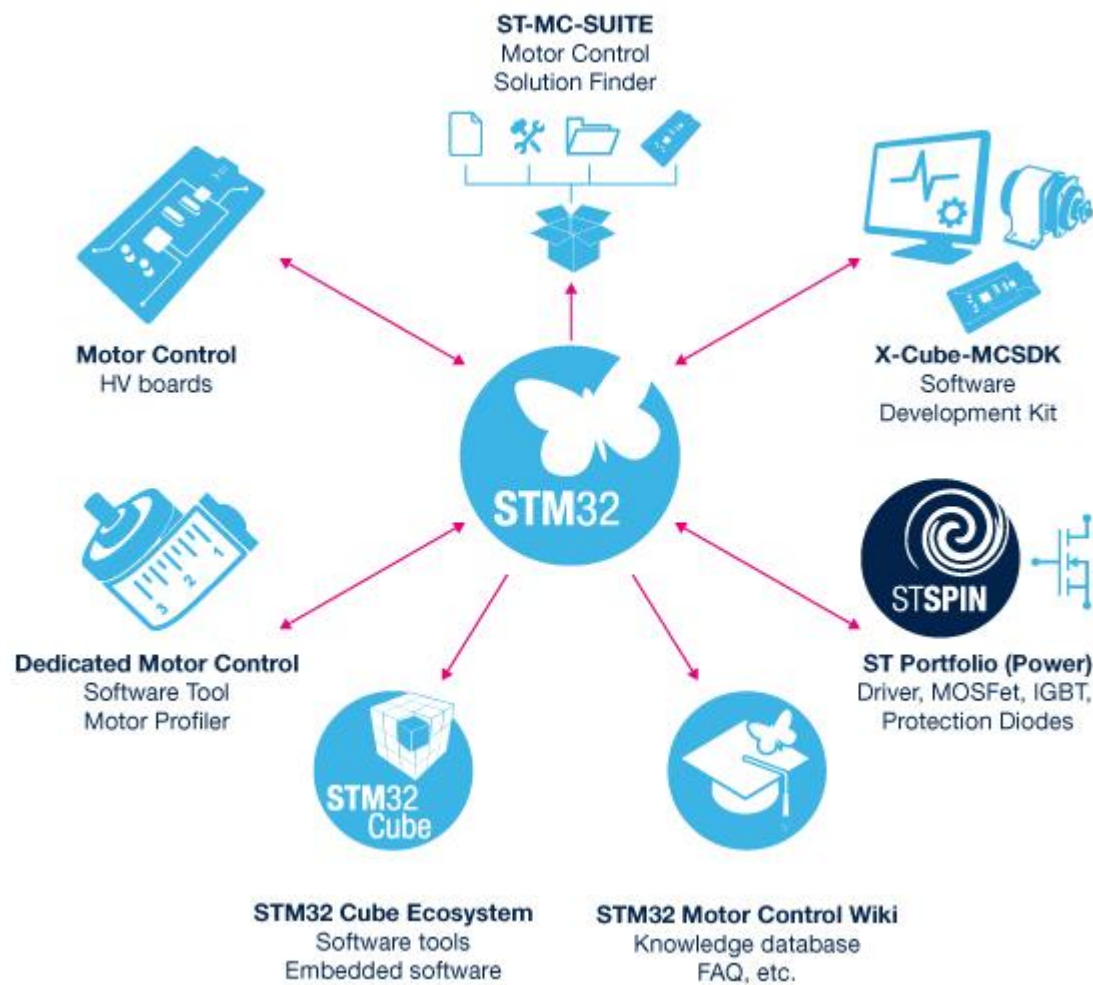
STM32H7 Features for Motor Control

Features	STM32H723/733/725/735/730	Benifit
Core	Cortex M7	Performance and efficiency
FPU	yes	Performance and efficiency
MPU	yes	Safety
Freq CPU max	550MHz	Performance and efficiency
DMIPS	1177	Performance and efficiency
Flash / SRAM data size	128kB to 1MB/564kB	Performance and integration/cost
Including: ICTM/DCTM RAM	Up to 256kB(configurable) / 128kB	Performance and efficiency
Error Code Correction	SECEDED on full memory map	Safety
ADC SAR	2x16bit 3.6Msps, 1x12bit 5Msps	Efficiency
Other Analog	2xcomp, 2xPGA, 2xDAC, 1xDFSDM	Integration/cost
Advanced Motor Control Timer	2x(275MHz)	Performance and efficiency
Cache and Accelerator	32kB+32kB L1 cache Graphic, CORDIC,FMAC,Cypro*	Performance and efficiency
Security Services (SFI and SB-SFU)	Yes*	System Integrity
Package	VFQFPN68 LQFP100/144/176 BGA100/144/169/176 WLCSP11	Cost/Integration/flexibility
Max Temperature range °C	[-40 .. +125] Tj max 140°C	Integration and cost

X-CUBE-MCSDK Update

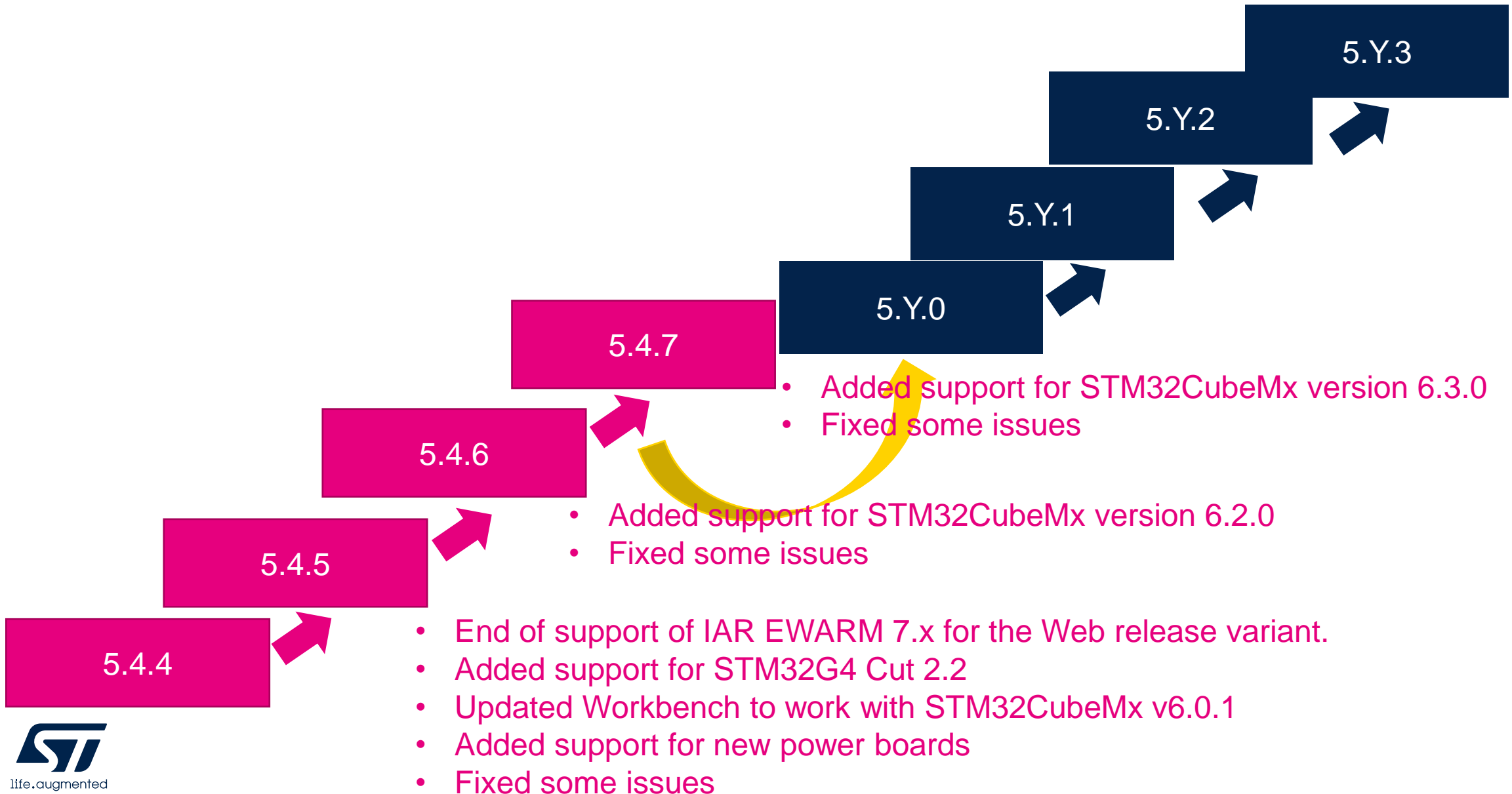


STM32 Ecosystem for Motor Control



- [X-CUBE-MCSDK](#)
- [ST-MC-SUITE](#)
- Motor Profiler
- [STM32 Cube Ecosystem](#)
- [STM32 Motor Control Wiki](#)

Update information since X-CUBE-MCSDK5.4.4



X-CUBE-MCSDK 5.Y(1/2)



- Introduced a version of ST Motor Pilot, the new monitoring tool of the X-CUBE_MCSDK.
- Removed the legacy Monitor from the Workbench
- A brand new communication protocol has been implemented and replace the legacy version.

For PMSM/BLDC Motors:

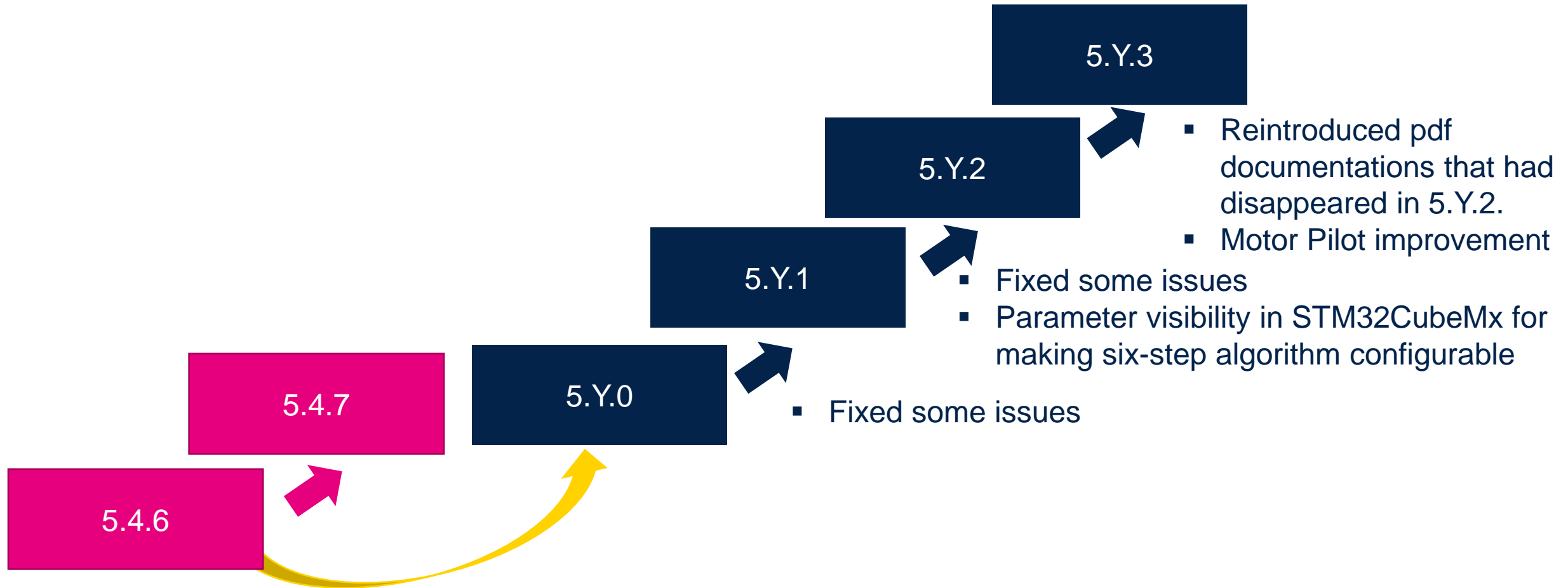
- Discontinuous PWM (aka. Two-phase modulation)
- Over Modulation can be activated from the Workbench, in the Firmware Drive Management / Additional Features tab
- Single Shunt with Phase Shift.
- Circle Limitation VD, a better variant of the circle limitation algorithm
- Added support for the STSPIN32G4 devices
- Added support for new boards
- Added support for the EVALSTDRIVE101 power board
- Added support of the HSI clock source for STM32L452 and STM32L476 devices.
- **Removed support for the STM32F1 devices series.(PFC using F1 is not supported anymore accordingly)**

- Six Step examples improvements

For Asynchronous Motors:

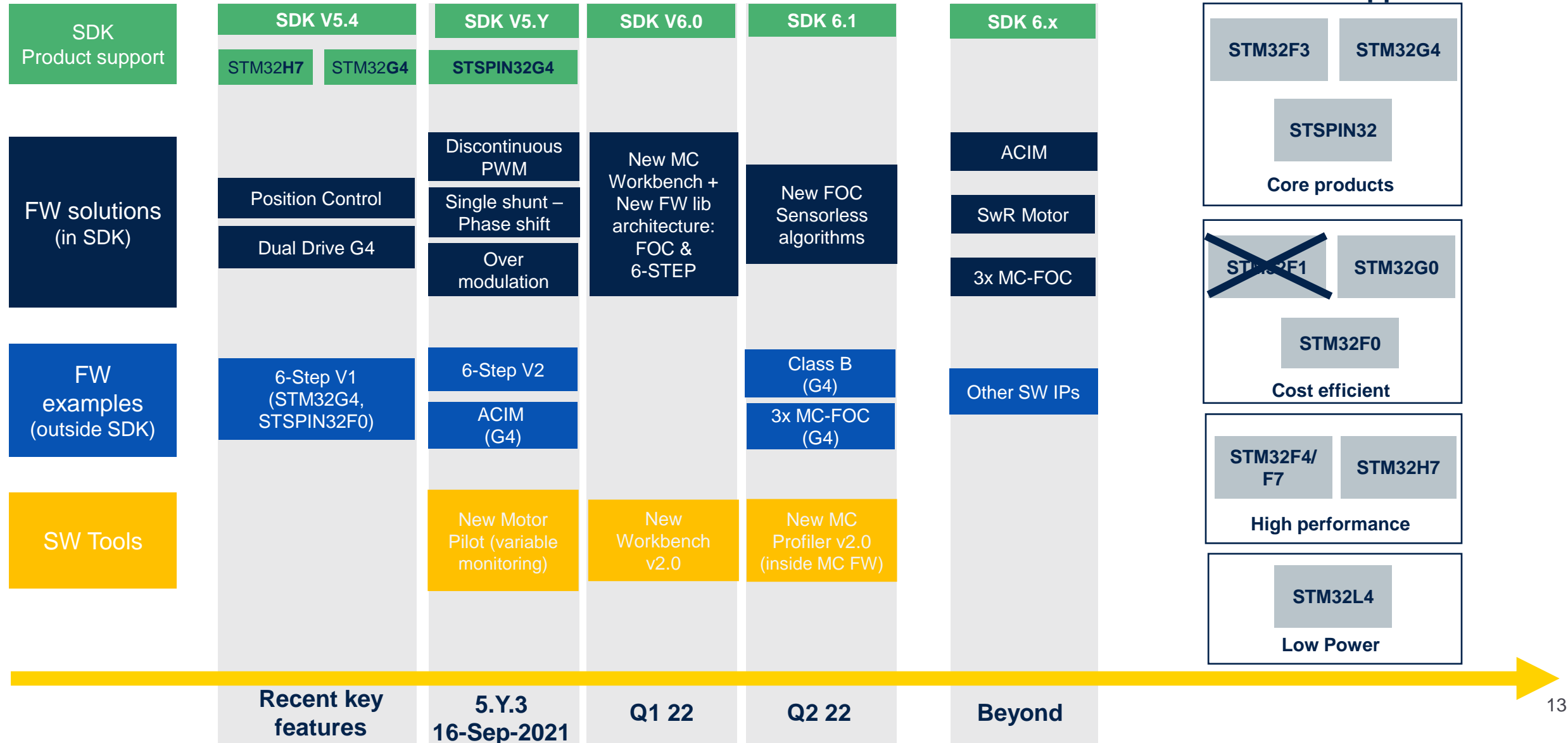
- ACIM motors are supported as two examples featuring FOC sensorless and V/f (scalar) modes. A graphical PC tool is delivered with the SDK to help configuring this example: ACIM GUI. The two examples are designed for NUCLEO-G431RB + STEVAL-IHM023V3 configurations.

X-CUBE-MCSDK 5.Y(2/2)





Motor Control – SDK Roadmap at a glance



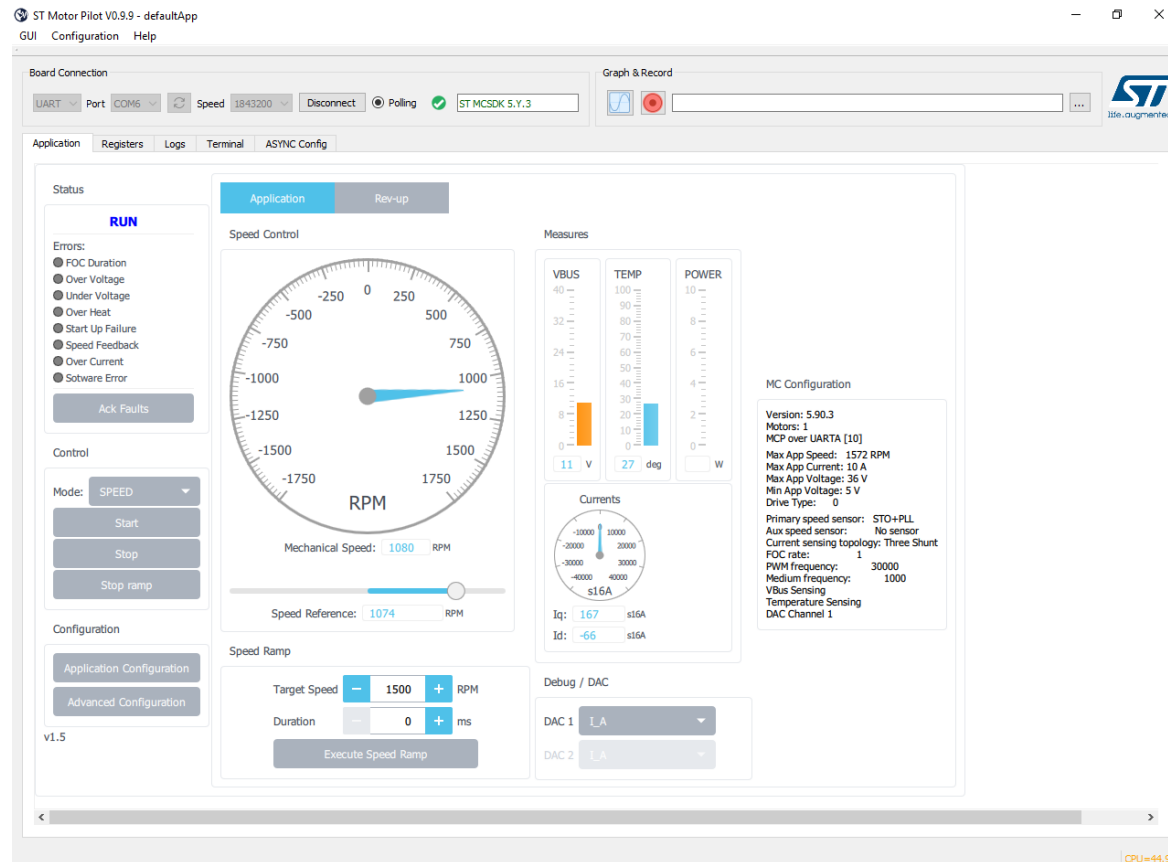
Reference documents

Doc Number	Title
UM2374	Getting started with STM32 motor control SDK v5.0
UM2392	STM32 motor control SDK5.x - Firmware
UM2380	STM32 motor control SDK v5.2 tools
AN5143	How to migrate motor control application software from SDK v4.3 to SDK v5.x
AN5166	Guidelines for control and customization of power boards with STM32 MC SDK v5.0

X-CUBE-MCSDK 5.Y.3 Demo

STM32 MC Motor Pilot

Monitoring tool for STM32 motor-control applications

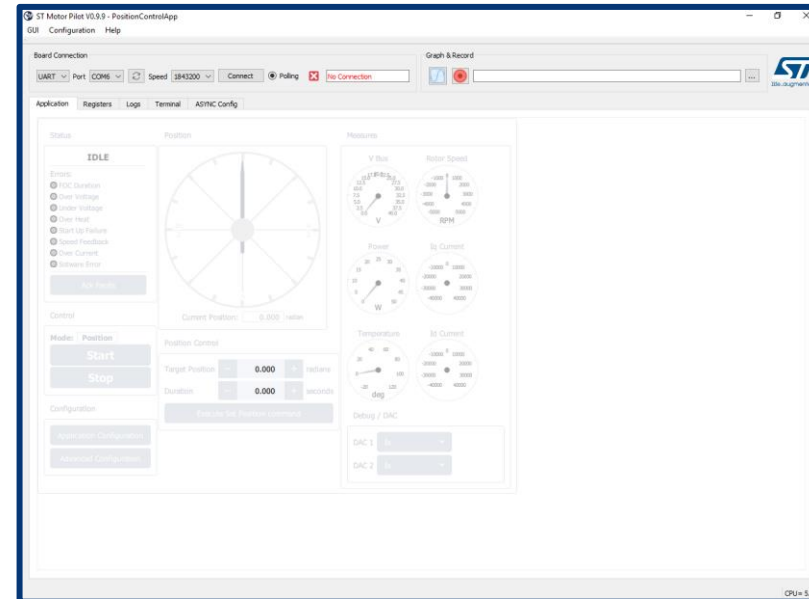
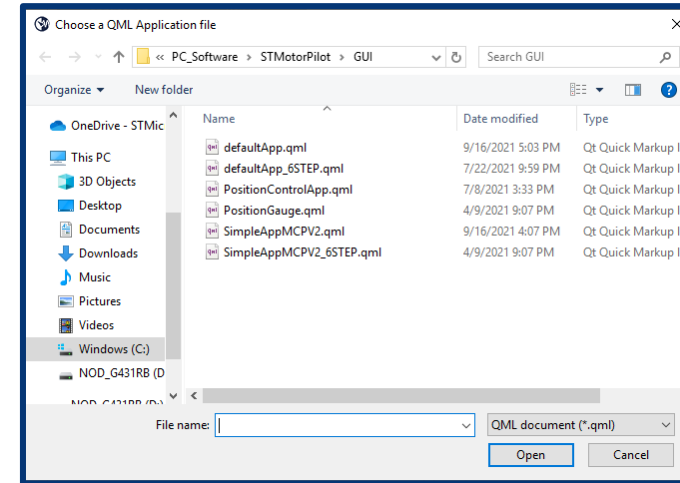
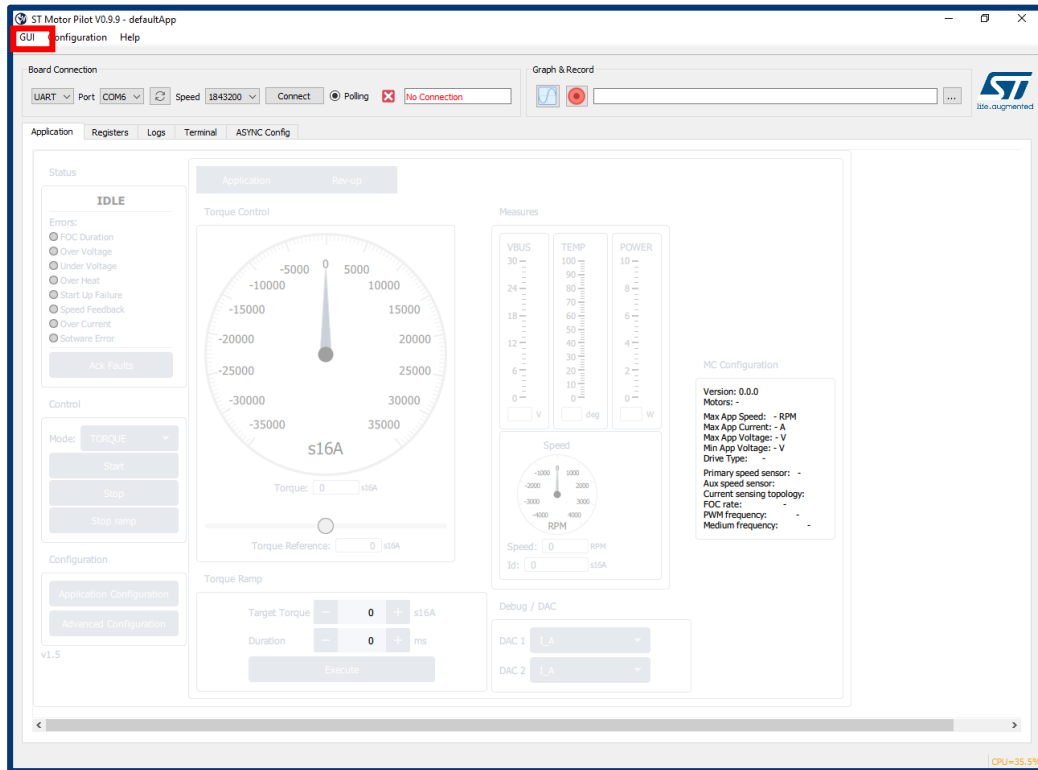


- Connects to MC applications built with the UI module through the serial port.
- Allows for controlling, monitoring, and tuning MC applications.
- Will replace the monitor part of STM32 MC workbench.

Runs on all three MCD target platforms: Windows, Mac, and Linux

- Enhanced plotting feature: the user can now plot most registers
- The user can easily customize GUI
 - To fit specific needs or to experiment with new firmware features
- Solid foundation to support future firmware features
 - ACIM, 6-Step, Sensorless Zero speed, enhanced debug features

Several Motor Pilot applications



Quick start-up

ST Motor Pilot V0.9.9 - defaultApp
GUI Configuration Help

Board Connection

UART Port COM6 Speed 1843200 Connect Polling No Connection

Graph & Record

Application Registers Logs Terminal ASYNC Config

Status

IDLE

Errors:

- FOC Duration
- Over Voltage
- Under Voltage
- Over Heat
- Start Up Failure
- Speed Feedback
- Over Current
- Software Error

Ack Faults

Control

Mode: TORQUE

Start

Stop

Stop ramp

Configuration

Application Configuration

Advanced Configuration

v1.5

Application Rev-up

Torque Control

Torque: 0 s16A

Torque Reference: 0 s16A

Torque Ramp

Target Torque: 0 s16A

Duration: 0 ms

Execute

Measures

VBUS: 30 24 18 12 6 0 V

TEMP: 100 90 80 70 60 50 40 30 20 10 0 deg

POWER: 10 8 6 4 2 0 W

Speed

Speed: 0 RPM

Id: 0 s16A

MC Configuration

Version: 0.0.0

Motors: -

Max App Speed: - RPM

Max App Current: - A

Max App Voltage: - V

Min App Voltage: - V

Drive Type: -

Primary speed sensor: -

Aux speed sensor: -

Current sensing topology: -

FOC rate: -

PWM frequency: -

Medium frequency: -

Debug / DAC

DAC 1: I_A

DAC 2: I_A

CPU=51.6%

Control the motor

The screenshot shows the ST Motor Pilot V0.9.9 - defaultApp GUI. The interface includes a top menu bar (GUI, Configuration, Help), a Board Connection section with dropdowns for UART, Port (COM6), Speed (343200), and buttons for Disconnect and Polling. A status bar at the bottom shows 'v1.5' and 'CPU=35.9%'. The main area is divided into several sections: Status (IDLE, Errors list, Ack Faults button), Control (Mode: SPEED, Start, Stop, Stop ramp buttons), Configuration (Application Configuration, Advanced Configuration buttons), and a central Speed Control section with a large RPM gauge, Mechanical Speed input, Speed Reference input, and Speed Ramp controls (Target Speed, Duration, Execute Speed Ramp button). On the right, there are graphs for VBUS, TEMP, and POWER, a Currents gauge, and an MC Configuration panel. Annotations with arrows point to various elements: 'Displays version of embedded firmware' points to the ST logo; 'Shows the current state and the errors' points to the Status section; 'Fault ack' points to the Ack Faults button; 'Spin the motor' points to the Start button; 'Click Stop to stop spinning the motor' points to the Stop button; 'Click Stop Ramp to stop it before end' points to the Stop ramp button; 'Set target speed, duration and click to apply a ramp' points to the Speed Ramp controls; 'Displays the speed, currents and other information' points to the central gauge and graphs; and 'Slide the knob to set the speed' points to the Speed Reference input.

ST Motor Pilot V0.9.9 - defaultApp
GUI Configuration Help

Board Connection
UART Port COM6 Speed 343200 Disconnect Polling ST MCDK 5.Y.3

Graph & Record

Application Registers Logs Terminal ASYNC Config

Status
IDLE
Errors:
● FOC Duration
● Over Voltage
● Under Voltage
● Over Heat
● Start Up Failure
● Speed Feedback
● Over Current
● Software Error
Ack Faults

Control
Mode: SPEED
Start
Stop
Stop ramp

Configuration
Application Configuration
Advanced Configuration

v1.5

Speed Control
Speed Control
RPM
Mechanical Speed: 0 RPM
Speed Reference: 1074 RPM
Speed Ramp
Target Speed 1500 RPM
Duration 0 ms
Execute Speed Ramp

Measures
VBUS 11 V
TEMP 27 deg
POWER
Currents
Iq: 0 s16A
Id: 0 s16A

MC Configuration
Version: 5.90.3
Motors: 1
MCP over UARTA [10]
Max App Speed: 1572 RPM
Max App Current: 10 A
Max App Voltage: 36 V
Min App Voltage: 5 V
Drive Type: 0
Primary speed sensor: STO+PLL
Aux speed sensor: No sensor
Current sensing topology: Three Shunt
FOC rate: 1
PWM frequency: 30000
Medium frequency: 1000
VBus Sensing
Temperature Sensing
DAC Channel 1

Debug / DAC
DAC 1 I_A
DAC 2 I_A

CPU=35.9%

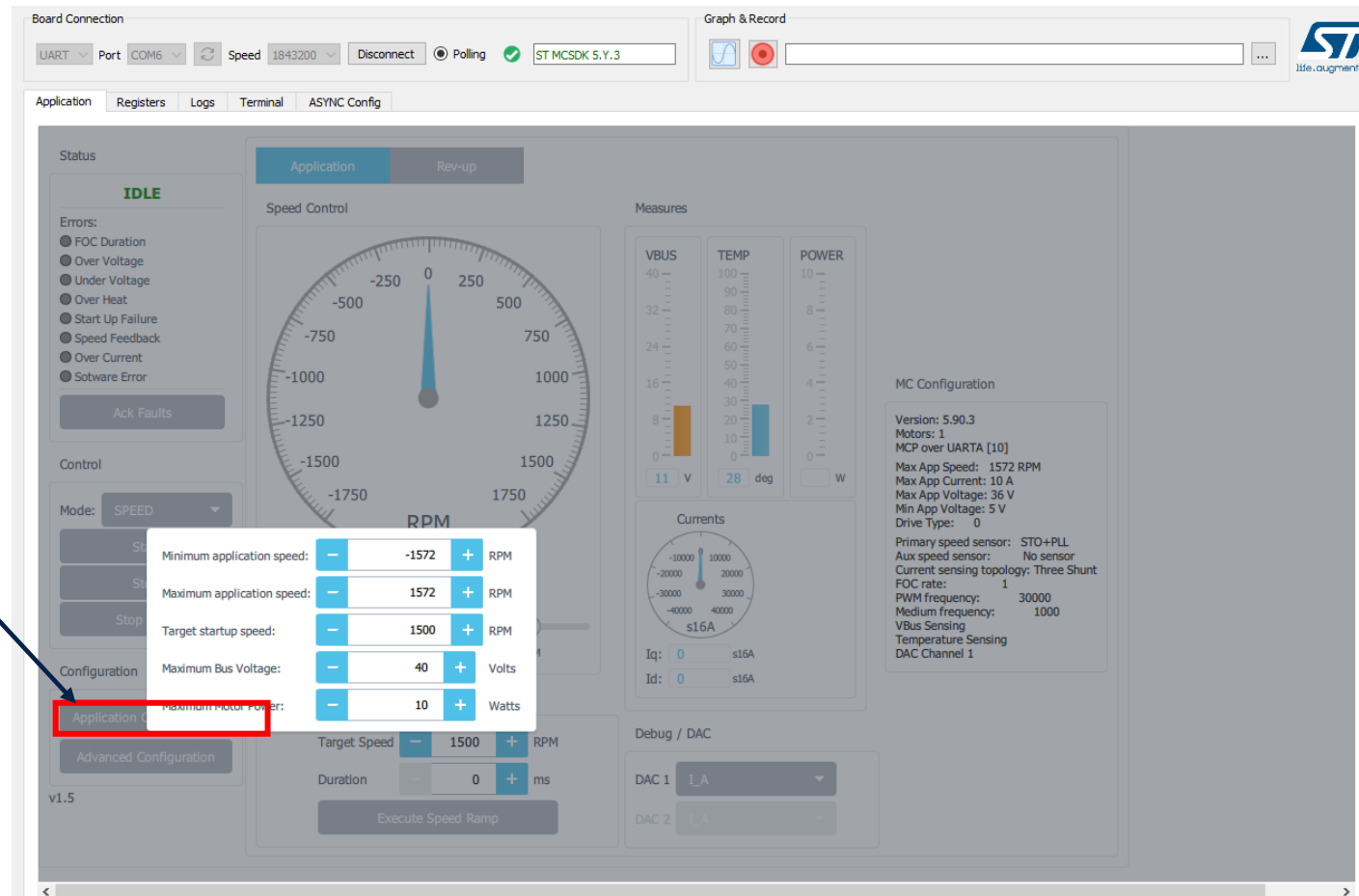
Annotations:

- Displays version of embedded firmware
- Shows the current state and the errors
- Fault ack
- Spin the motor
- Click Stop to stop spinning the motor
- Click Stop Ramp to stop it before end
- Set target speed, duration and click to apply a ramp
- Displays the speed, currents and other information
- Slide the knob to set the speed

MC application parameters

STM32 MC Motor Pilot gets MC application parameters from the board and adapts widgets to them

MC
application
parameters



MC application advanced settings(1)

Speed PID, Torque PID, Flux PID and Flux reference

Click
Advanced
Configuration

The screenshot displays the ST MC application software interface. At the top, the 'Board Connection' section shows 'UART' selected for 'Port COM6' with a speed of '1843200'. The 'Graph & Record' section is empty. The 'Application' tab is active, showing a status of 'IDLE' and a list of errors including FOC Duration, Over Voltage, Under Voltage, Over Heat, Start Up Failure, Speed Feedback, Over Current, and Software Error. The 'Control' section has 'Mode: SPEED' and buttons for 'Start', 'Stop', and 'Stop ramp'. The 'Configuration' section has 'Application Configuration' and 'Advanced Configuration' (highlighted with a red box). The 'Speed Control' section features a large RPM gauge, a 'Mechanical Speed' of 0 RPM, and a 'Speed Reference' of 1058 RPM. The 'Measures' section shows 'VBUS' at 11 V, 'TEMP' at 28 deg, and 'POWER' at 0 W. The 'Currents' section shows 'Iq' and 'Id' at 0 s16A. The 'Speed Ramp' section has a 'Target Speed' of 1500 RPM and a 'Duration' of 0 ms. The 'MC Configuration' section lists various parameters including Version: 5.90.3, Motors: 1, MCP over UARTA [10], Max App Speed: 1572 RPM, Max App Current: 10 A, Max App Voltage: 36 V, Min App Voltage: 5 V, Drive Type: 0, Primary speed sensor: STO+PLL, Aux speed sensor: No sensor, Current sensing topology: Three Shunt, FOC rate: 1, PWM frequency: 30000, Medium frequency: 1000, VBus Sensing, Temperature Sensing, and DAC Channel 1. The 'Debug / DAC' section shows 'DAC 1' and 'DAC 2' set to 'I_A'.

MC application advanced settings(2)

Speed PID, Torque PID, Flux PID and Flux reference

The screenshot displays the ST MC application advanced settings interface. The interface is divided into several sections:

- Board Connection:** Shows UART Port COM6, Speed 1843200, and a green status indicator for ST MCDK 5.Y.3.
- Application:** Includes tabs for Registers, Logs, Terminal, and ASYNC Config.
- Status:** Displays the current status as **IDLE** and lists various error types such as FOC Duration, Over Voltage, Under Voltage, Over Heat, Start Up Failure, Speed Feedback, Over Current, and Software Error.
- Control:** Features a Mode dropdown set to **SPEED** and buttons for Start, Stop, and Stop ramp.
- Configuration:** Contains buttons for Application Configuration and **Advanced Configuration**.
- Speed Control:** A large circular gauge shows the Mechanical Speed at 0 RPM. Below it, the Speed Reference is set to 1058 RPM.
- Measures:** Includes three vertical bar charts for VBUS (11 V), TEMP (28 deg), and POWER (0 W). Below these are two circular gauges for Currents (Iq and Id) both at 0 s16A.
- MC Configuration:** A text box providing system details: Version: 5.90.3, Motors: 1, MCP over UARTA [10], Max App Speed: 1572 RPM, Max App Current: 10 A, Max App Voltage: 36 V, Min App Voltage: 5 V, Drive Type: 0, Primary speed sensor: STO+PLL, Aux speed sensor: No sensor, Current sensing topology: Three Shunt, FOC rate: 1, PWM frequency: 30000, Medium frequency: 1000, VBus Sensing, Temperature Sensing, and DAC Channel 1.
- Speed Ramp:** Includes a Target Speed slider set to 1500 RPM and a Duration slider set to 0 ms, with an Execute Speed Ramp button.
- Debug / DAC:** Shows DAC 1 and DAC 2 both set to I_A.
- Advanced Configuration (highlighted in red):** This section contains detailed PID settings:
 - Speed PI regulator:** Speed Kp: 2714 s16A, Speed Ki: 559 s16A, Kp divisor: 256, Ki divisor: 16384.
 - Torque (Iq) PI regulator:** Torque Kp: 3540 s16A, Torque Ki: 2360 s16A.
 - Flux (Id) PI:** Flux Kp: 3540 s16V/s, Flux Ki: 2360 s16V/s.
 - Flux Reference:** Set to 0.

MC application advanced settings(3)

State Observer, PLL parameters, CORDIC parameters and DAC settings

The screenshot displays the ST MC application software interface. The top bar shows 'Board Connection' with 'UART' selected, 'Port COM6', 'Speed 1843200', 'Disconnect', 'Polling', and 'ST MCDK 5.Y.3'. The 'Graph & Record' section is empty. The 'Application' tab is active, showing 'Registers', 'Logs', 'Terminal', and 'ASYNC Config'. The main interface is divided into several sections:

- Speed Control:** A large circular speedometer showing 'RPM' from -1750 to 1750. Below it, 'Mechanical Speed: 0 RPM' and 'Speed Reference: 1315 RPM' are displayed. A 'Speed Ramp' section includes 'Target Speed: 1500 RPM' and 'Duration: 0 ms'.
- Measures:** Three vertical gauges for 'VBUS' (0-40V), 'TEMP' (0-100deg), and 'POWER' (0-10W). Below them, 'Currents' are shown with a circular gauge for 'Iq' and 'Id' (0-10000 s16A).
- MC Configuration:** A section on the right listing system parameters: Version: 5.90.3, Motors: 1, MCP over UARTA [10], Max App Speed: 1572 RPM, Max App Current: 10 A, Max App Voltage: 36 V, Min App Voltage: 5 V, Drive Type: 0, Primary speed sensor: STO+PLL, Aux speed sensor: No sensor, Current sensing topology: Three Shunt, FOC rate: 1, PWM frequency: 30000, Medium frequency: 1000, VBus Sensing, Temperature Sensing, DAC Channel 1.
- Advanced Configuration:** A section on the right with a red border, containing a table for 'State Observer with PLL' parameters:

	Currents_Speed	Observers
C1:	-22528	N/A
C2:	31533	N/A
PLL Kp:	195	dpp/s16V
PLL Ki:	4	dpp/s16V

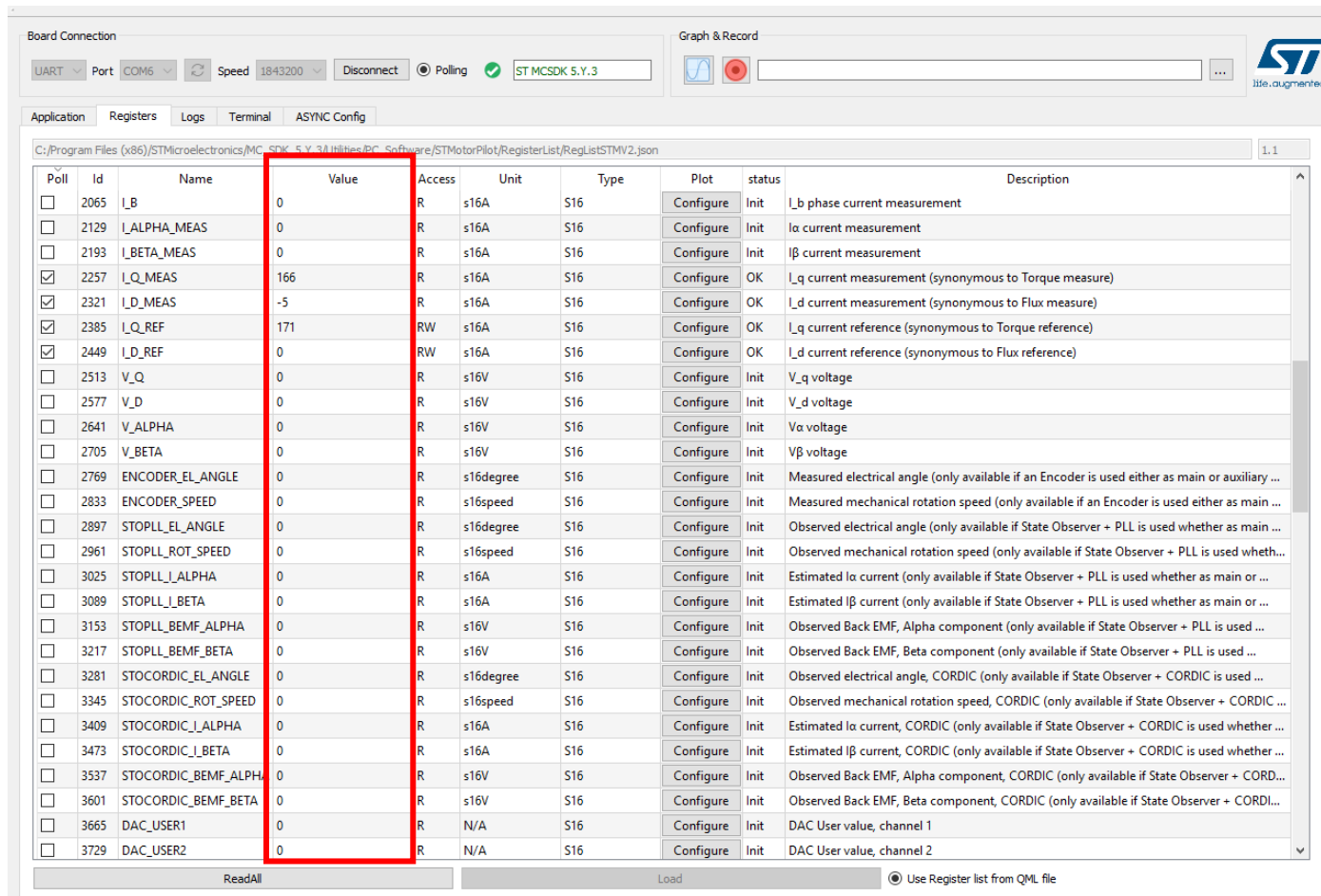
Below the 'Advanced Configuration' section, a 'Debug / DAC' section is visible with a red border, showing 'DAC 1' and 'DAC 2' dropdown menus set to 'I_A'.

State Observer + PLL parameters
State Observer + CORDIC parameters

DAC settings

Viewing registers by pooling (low-speed plotting)

Clicking the Registers tab displays the list of all the registers, which can be streamed to the Pilot



Board Connection

UART Port COM6 Speed 1843200 Disconnect Polling ST MCDK 5.Y.3

Graph & Record

Application Registers Logs Terminal ASYNC Config

C:\Program Files (x86)\STMicroelectronics\MC-SDK 5.Y.3\Utilities\PC Software\STMotorPilot\RegisterList\RegListSTMV2.json 1.1

Poll	Id	Name	Value	Access	Unit	Type	Plot	status	Description
<input type="checkbox"/>	2065	I_B	0	R	s16A	S16	Configure	Init	I_b phase current measurement
<input type="checkbox"/>	2129	I_ALPHA_MEAS	0	R	s16A	S16	Configure	Init	I α current measurement
<input type="checkbox"/>	2193	I_BETA_MEAS	0	R	s16A	S16	Configure	Init	I β current measurement
<input checked="" type="checkbox"/>	2257	I_Q_MEAS	166	R	s16A	S16	Configure	OK	I q current measurement (synonymous to Torque measure)
<input checked="" type="checkbox"/>	2321	I_D_MEAS	-5	R	s16A	S16	Configure	OK	I d current measurement (synonymous to Flux measure)
<input checked="" type="checkbox"/>	2385	I_Q_REF	171	RW	s16A	S16	Configure	OK	I q current reference (synonymous to Torque reference)
<input checked="" type="checkbox"/>	2449	I_D_REF	0	RW	s16A	S16	Configure	OK	I d current reference (synonymous to Flux reference)
<input type="checkbox"/>	2513	V_Q	0	R	s16V	S16	Configure	Init	V q voltage
<input type="checkbox"/>	2577	V_D	0	R	s16V	S16	Configure	Init	V d voltage
<input type="checkbox"/>	2641	V_ALPHA	0	R	s16V	S16	Configure	Init	V α voltage
<input type="checkbox"/>	2705	V_BETA	0	R	s16V	S16	Configure	Init	V β voltage
<input type="checkbox"/>	2769	ENCODER_EL_ANGLE	0	R	s16degree	S16	Configure	Init	Measured electrical angle (only available if an Encoder is used either as main or auxiliary ...)
<input type="checkbox"/>	2833	ENCODER_SPEED	0	R	s16speed	S16	Configure	Init	Measured mechanical rotation speed (only available if an Encoder is used either as main ...)
<input type="checkbox"/>	2897	STOPLL_EL_ANGLE	0	R	s16degree	S16	Configure	Init	Observed electrical angle (only available if State Observer + PLL is used whether as main ...)
<input type="checkbox"/>	2961	STOPLL_ROT_SPEED	0	R	s16speed	S16	Configure	Init	Observed mechanical rotation speed (only available if State Observer + PLL is used wheth...
<input type="checkbox"/>	3025	STOPLL_I_ALPHA	0	R	s16A	S16	Configure	Init	Estimated I α current (only available if State Observer + PLL is used whether as main or ...)
<input type="checkbox"/>	3089	STOPLL_I_BETA	0	R	s16A	S16	Configure	Init	Estimated I β current (only available if State Observer + PLL is used whether as main or ...)
<input type="checkbox"/>	3153	STOPLL_BEMF_ALPHA	0	R	s16V	S16	Configure	Init	Observed Back EMF, Alpha component (only available if State Observer + PLL is used ...)
<input type="checkbox"/>	3217	STOPLL_BEMF_BETA	0	R	s16V	S16	Configure	Init	Observed Back EMF, Beta component (only available if State Observer + PLL is used ...)
<input type="checkbox"/>	3281	STOCORDIC_EL_ANGLE	0	R	s16degree	S16	Configure	Init	Observed electrical angle, CORDIC (only available if State Observer + CORDIC is used ...)
<input type="checkbox"/>	3345	STOCORDIC_ROT_SPEED	0	R	s16speed	S16	Configure	Init	Observed mechanical rotation speed, CORDIC (only available if State Observer + CORDIC ...)
<input type="checkbox"/>	3409	STOCORDIC_I_ALPHA	0	R	s16A	S16	Configure	Init	Estimated I α current, CORDIC (only available if State Observer + CORDIC is used whether ...)
<input type="checkbox"/>	3473	STOCORDIC_I_BETA	0	R	s16A	S16	Configure	Init	Estimated I β current, CORDIC (only available if State Observer + CORDIC is used whether ...)
<input type="checkbox"/>	3537	STOCORDIC_BEMF_ALPHA	0	R	s16V	S16	Configure	Init	Observed Back EMF, Alpha component, CORDIC (only available if State Observer + CORD...
<input type="checkbox"/>	3601	STOCORDIC_BEMF_BETA	0	R	s16V	S16	Configure	Init	Observed Back EMF, Beta component, CORDIC (only available if State Observer + CORDI...
<input type="checkbox"/>	3665	DAC_USER1	0	R	N/A	S16	Configure	Init	DAC User value, channel 1
<input type="checkbox"/>	3729	DAC_USER2	0	R	N/A	S16	Configure	Init	DAC User value, channel 2

ReadAll Load Use Register list from QML file

Plotting registers by pooling (low-speed plotting)

Register selection for ASYNC plot available

Board Connection: UART Port COM6 Speed 1843200 Disconnect Polling ST MCDK 5.Y.3

Graph & Record

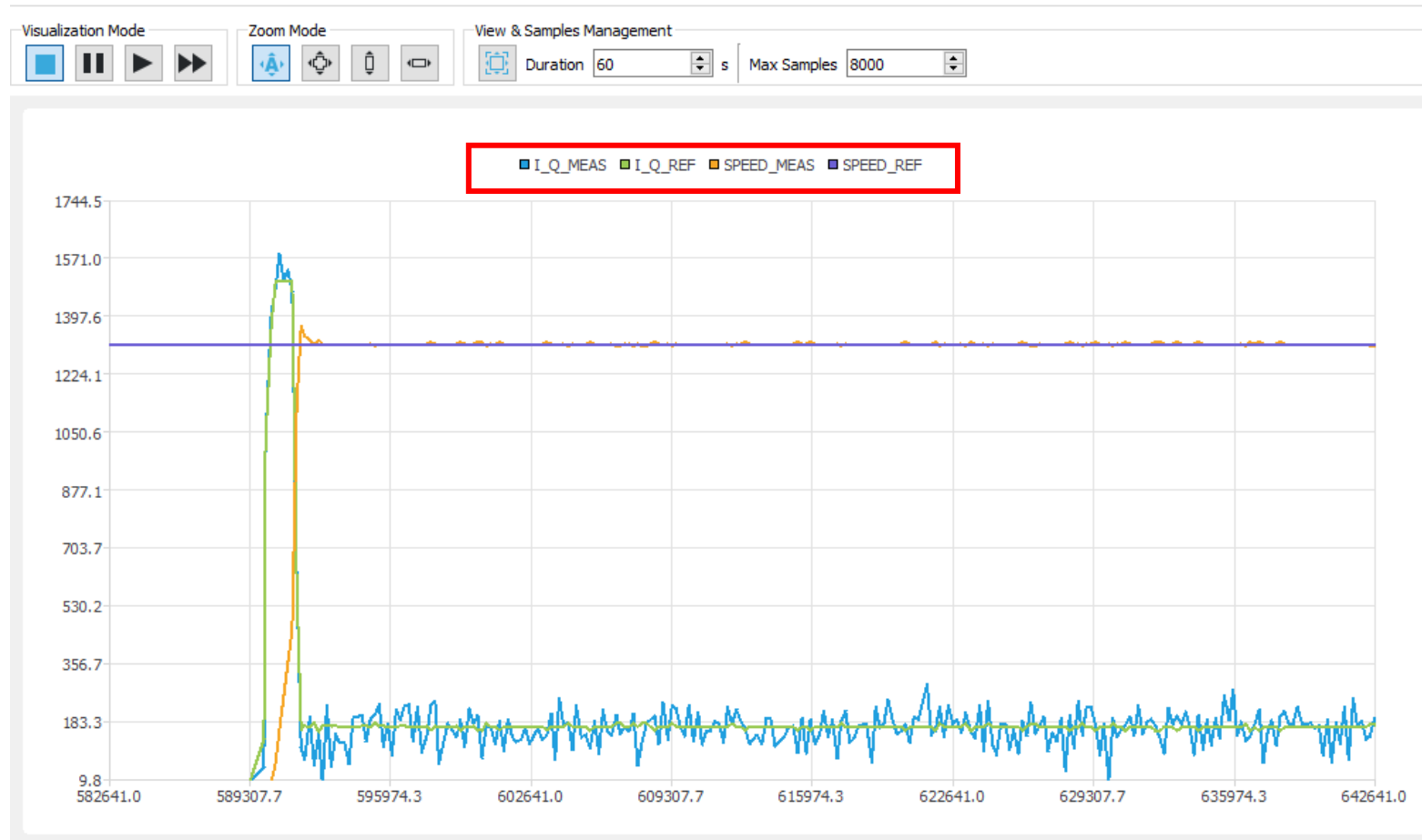
Application Registers Logs Terminal ASYNC Config

C:\Program Files (x86)\STMicroelectronics\MC_SDK_5.Y.3\Utilities\PC_Software\STMotorPilot\RegisterList\RegListSTMV2.json 1.1

Poll	Id	Name	Value	Access	Unit	Type	Plot	status	Description
<input type="checkbox"/>	2065	I_B	0	R	s16A	S16	Configure	Init	I_b phase current measurement
<input type="checkbox"/>	2129	I_ALPHA_MEAS	0	R	s16A	S16	Configure	Init	Ia current measurement
<input type="checkbox"/>	2193	I_BETA_MEAS	0	R	s16A	S16	Configure	Init	Iβ current measurement
<input checked="" type="checkbox"/>	2257	I_Q_MEAS	186	R	s16A	S16	Configure	Init	Iq current measurement (synonymous to Torque measure)
<input checked="" type="checkbox"/>	2321	I_D_MEAS	-19	R	s16A	S16	Configure	Init	Id current measurement (synonymous to Flux measure)
<input checked="" type="checkbox"/>	2385	I_Q_REF	166	RW	s16A	S16	Configure	Init	Iq reference (synonymous to Torque reference)
<input checked="" type="checkbox"/>	2449	I_D_REF	0	RW	s16A	S16	Configure	Init	Id reference (synonymous to Flux reference)
<input type="checkbox"/>	2513	V_Q	0	R	s16V	S16	Configure	Init	Vq voltage
<input type="checkbox"/>	2577	V_D	0	R	s16V	S16	Configure	Init	Vd voltage
<input type="checkbox"/>	2641	V_ALPHA	0	R	s16V	S16	Configure	Init	Va voltage
<input type="checkbox"/>	2705	V_BETA	0	R	s16V	S16	Configure	Init	Vβ voltage
<input type="checkbox"/>	2769	ENCODER_EL_ANGLE	0	R	s16degree	S16	Configure	Init	Measured electrical angle (only available if an Encoder is used either as main or auxiliary ...)
<input type="checkbox"/>	2833	ENCODER_SPEED	0	R	s16speed	S16	Configure	Init	Measured mechanical rotation speed (only available if an Encoder is used either as main or auxiliary ...)
<input type="checkbox"/>	2897	STOPLL_EL_ANGLE	0	R	s16degree	S16	Configure	Init	Observed electrical angle (only available if State Observer + PLL is used whether as main or auxiliary ...)
<input type="checkbox"/>	2961	STOPLL_ROT_SPEED	0	R	s16speed	S16	Configure	Init	Observed mechanical rotation speed (only available if State Observer + PLL is used whether as main or auxiliary ...)
<input type="checkbox"/>	3025	STOPLL_I_ALPHA	0	R	s16A	S16	Configure	Init	Estimated Ia current (only available if State Observer + PLL is used whether as main or auxiliary ...)
<input type="checkbox"/>	3089	STOPLL_I_BETA	0	R	s16A	S16	Configure	Init	Estimated Iβ current (only available if State Observer + PLL is used whether as main or auxiliary ...)
<input type="checkbox"/>	3153	STOPLL_BEMF_ALPHA	0	R	s16V	S16	Configure	Init	Observed Back EMF, Alpha component (only available if State Observer + PLL is used whether as main or auxiliary ...)
<input type="checkbox"/>	3217	STOPLL_BEMF_BETA	0	R	s16V	S16	Configure	Init	Observed Back EMF, Beta component (only available if State Observer + PLL is used whether as main or auxiliary ...)
<input type="checkbox"/>	3281	STOCORDIC_EL_ANGLE	0	R	s16degree	S16	Configure	Init	Observed electrical angle, CORDIC (only available if State Observer + CORDIC is used whether as main or auxiliary ...)
<input type="checkbox"/>	3345	STOCORDIC_ROT_SPEED	0	R	s16speed	S16	Configure	Init	Observed mechanical rotation speed, CORDIC (only available if State Observer + CORDIC is used whether as main or auxiliary ...)
<input type="checkbox"/>	3409	STOCORDIC_I_ALPHA	0	R	s16A	S16	Configure	Init	Estimated Ia current, CORDIC (only available if State Observer + CORDIC is used whether as main or auxiliary ...)
<input type="checkbox"/>	3473	STOCORDIC_I_BETA	0	R	s16A	S16	Configure	Init	Estimated Iβ current, CORDIC (only available if State Observer + CORDIC is used whether as main or auxiliary ...)
<input type="checkbox"/>	3537	STOCORDIC_BEMF_ALPHA	0	R	s16V	S16	Configure	Init	Observed Back EMF, Alpha component, CORDIC (only available if State Observer + CORDIC is used whether as main or auxiliary ...)
<input type="checkbox"/>	3601	STOCORDIC_BEMF_BETA	0	R	s16V	S16	Configure	Init	Observed Back EMF, Beta component, CORDIC (only available if State Observer + CORDIC is used whether as main or auxiliary ...)
<input type="checkbox"/>	3665	DAC_USER1	0	R	N/A	S16	Configure	Init	DAC User value, channel 1
<input type="checkbox"/>	3729	DAC_USER2	0	R	N/A	S16	Configure	Init	DAC User value, channel 2

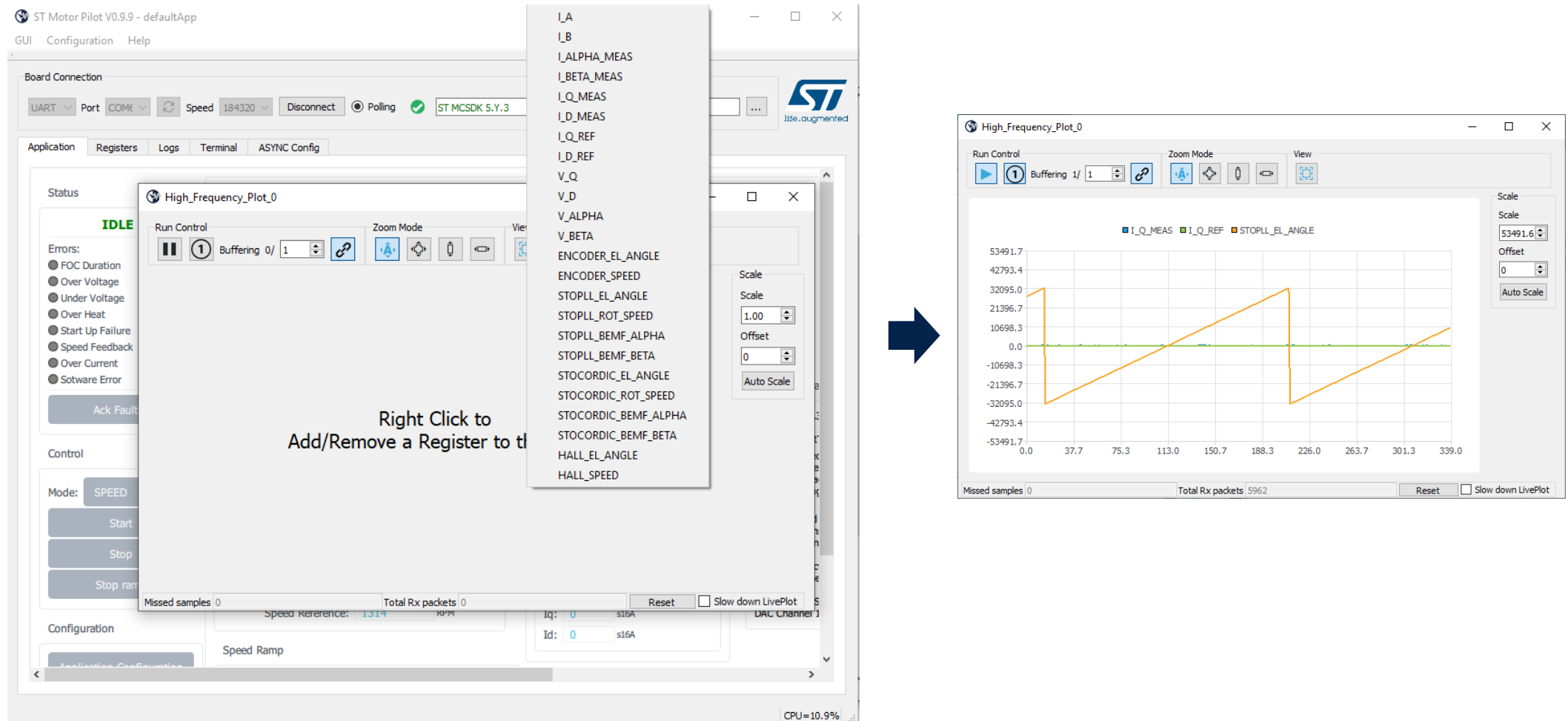
ReadAll Load Use Register list from QML file

Plotting registers by pooling (low-speed plotting)



Datalog Service

Provides an oscilloscope-like display to plot high frequency tasks



Highlights on X-CUBE-MCSDK

Driving one or two different motors simultaneously (one for 6-Step)

- A PC software application to automatically measure electromechanical parameters of PMSM motors (**STM32F30x and STM32F4xx only**);
- LCD screen on EVAL boards **not supported**;
- Development Toolchains:
 - IAR Embedded Workbench for ARM (IAR Systems AB) v8.20.2. (**no support for v7.x.x**)
 - µVision® IDE for Arm® (Keil® MDK) v5.24.2
 - STM32CubeIDE v1.6.1
 - STM32CubeProgrammer 2.6.0

Highlights (2)

X-CUBE-MCSDK version 5.Y is released to provide insight on the directions that the development of the Motor Control SDK is following

- **STM32F1 Family is not supported by X-CUBE-MCSDK version 5.Y.** If you are using a STM32F1 MCU, please keep on using X-CUBE-MCSDK 5.4.x versions.
- **Dual Drive is not supported by current X-CUBE-MCSDK version 5.Y.** If you are using dual drive, please keep on using X-CUBE-MCSDK 5.4.x versions.
- **Projects generated with previous X-CUBE-MCSDK versions will not load with the version 5.Y.** Please stay with versions 5.4.x if you want to keep the compatibility.
- X-CUBE-MCSDK version 5.Y is not intended to reach the same level of maturity as legacy X-CUBE-MCSDK version 5.4.6

SPEED_UNIT (from release v5.4.0)

previous speed unit used by API functions that expect or return a speed (e.g., `MC_ProgramSpeedRampMotor1()` or `MC_GetMecSpeedAverageMotor1()`)

- 01Hz (a tenth of a Hertz)

It is now possible to use other units for these functions. With release 5.4.0, the two new speed units are made available:

- RPM (Revolution Per Minute)
- 001Hz (a hundredth of a Hertz)

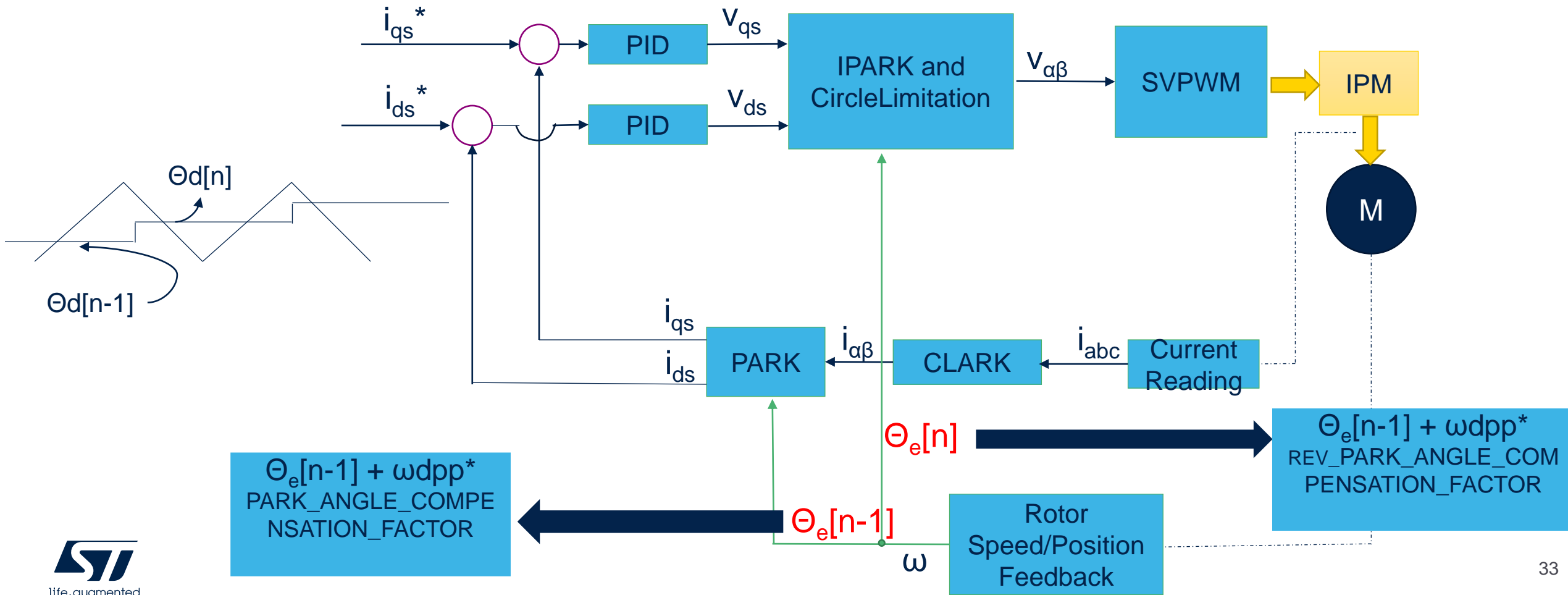
The choice of the speed unit is made at compile time by setting the `SPEED_UNIT` symbol to the proper value in file `mc_stm_types.h`:

- `_RPM`
- `_001HZ`
- `_01HZ`

The `SPEED_UNIT` define is placed in a User Section and retained after project regeneration.

Highlights (4)

Electric Angle Estimation Compensation for Sensorless (from release v5.4.0)



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