



Industrial  
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# X-CUBE-MCSDK更新

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意法半导体

1 用于电机控制的STM32

2 X-CUBE-MCSDK更新

3 X-CUBE-MCSDK 5.Y.3演示

4 X-CUBE-MCSDK的要点

5 Q&A



# 用于电机控制的STM32

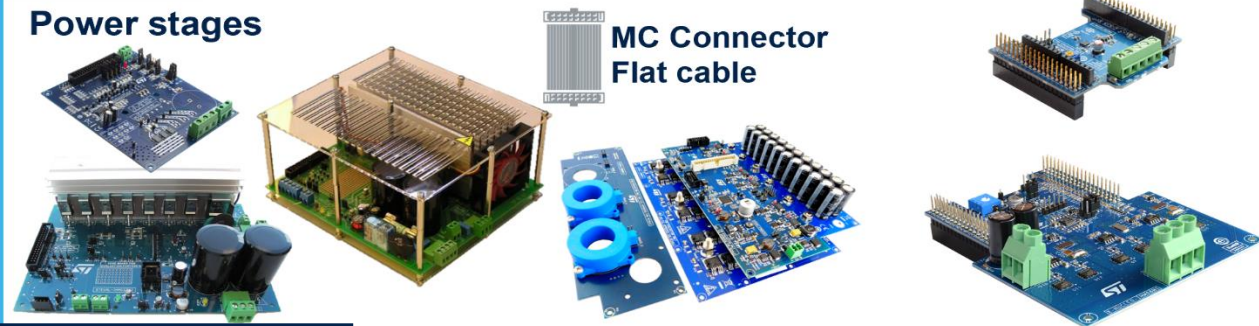
## Control + Power

## Eval/Nucleo + Power/Expansion

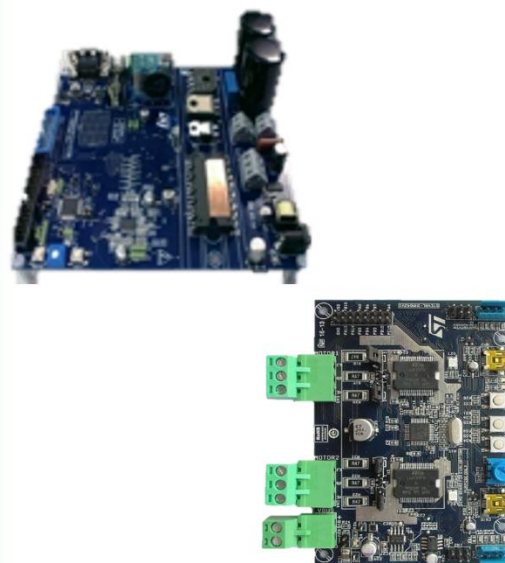
## Control stages



## Power stages



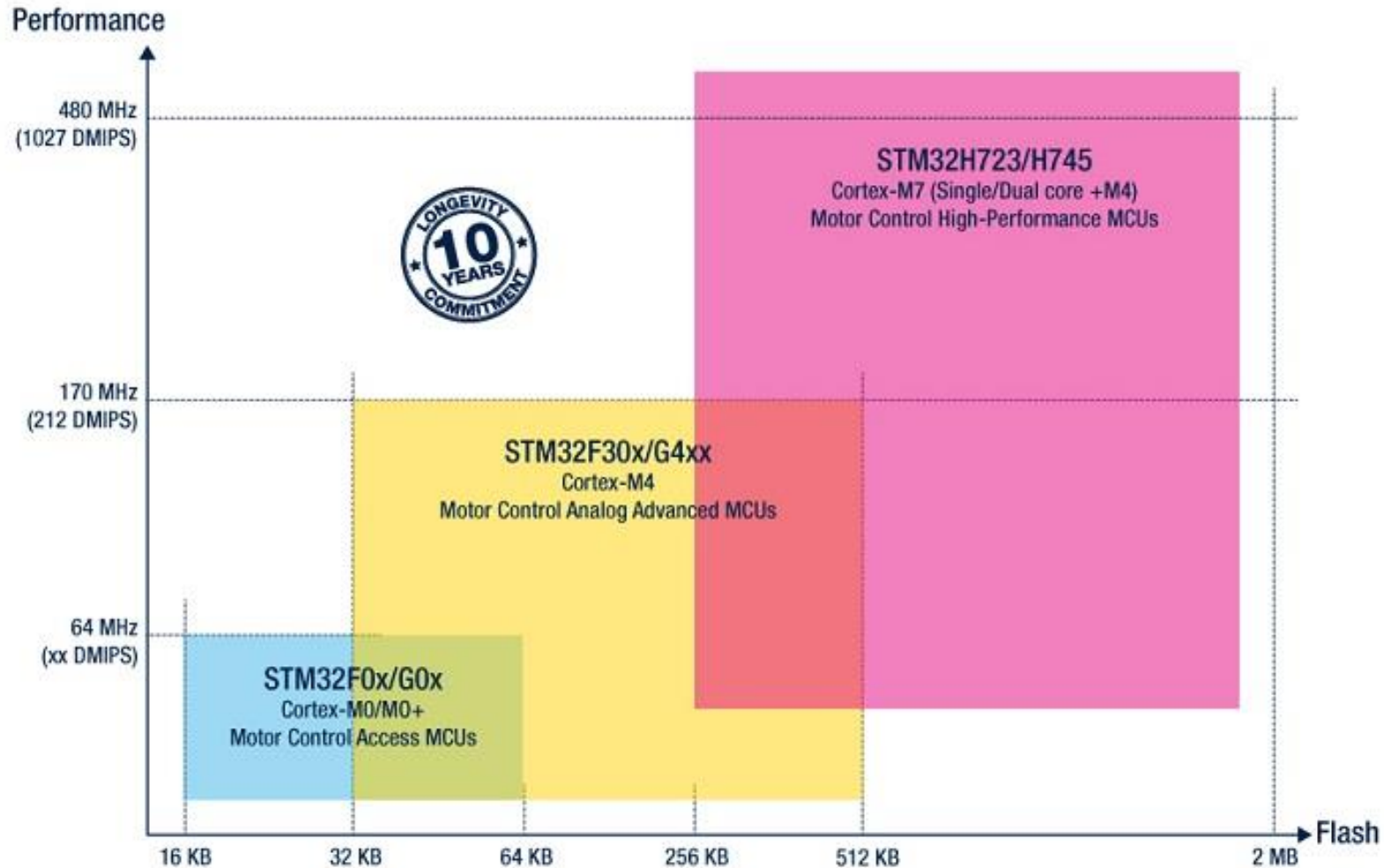
## Inverter (Complete Drive)



## MC Kits



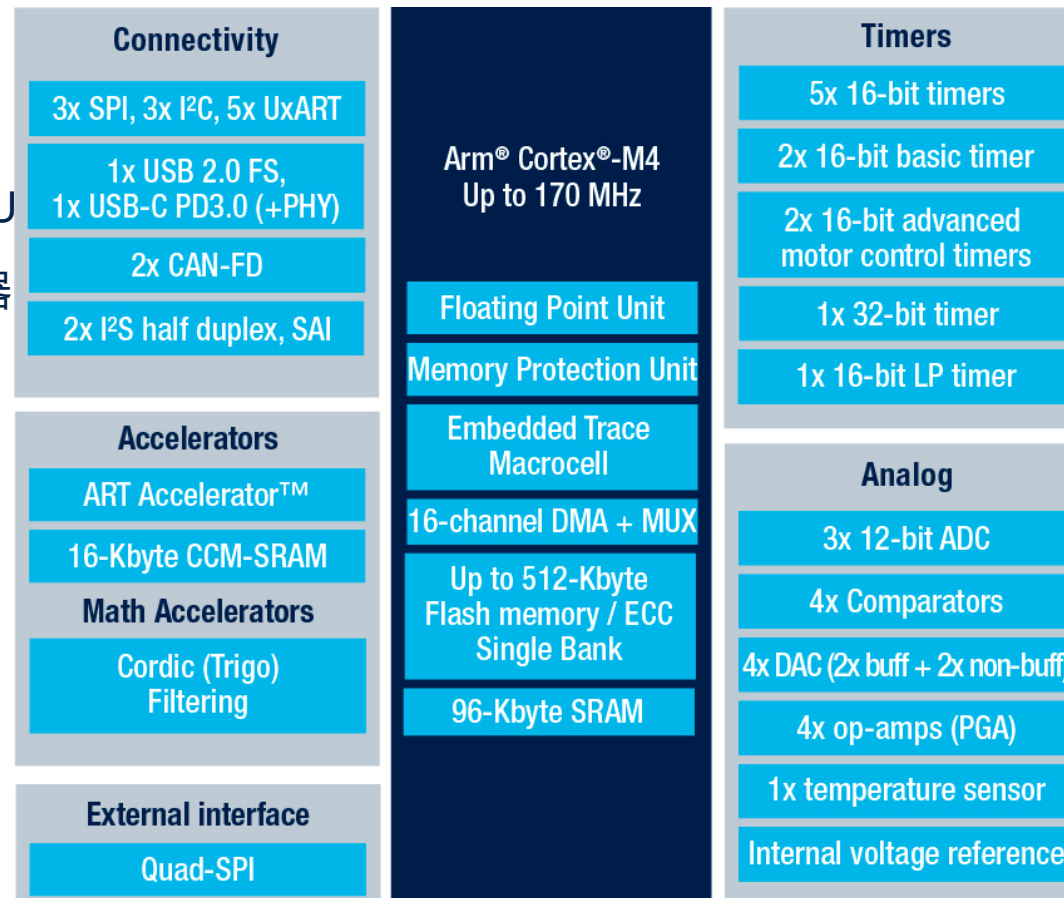
# 用于电机控制的STM32



# STM32G491框图

## 基本型[32KB ..512KB]

- 32位Arm Cortex-M4内核，带FPU
- ART + CCM-SRAM + 数学加速器
- 带ECC的单存储区闪存
- 带奇偶校验位的SRAM
- +/- 1%内部时钟
- 1.72至3.6V电源
- 高达 125°C



- 高级电机控制定时器
- 丰富、先进的模拟
- CAN灵活数据速率
- USB-C Power Delivery3.0
- 高级安全与安全特性
- 稳健性：最高级别5/ FTB/ESD - IEC 61000-4-4

# STM32 G0超值型-STM32G030

- 32位Arm Cortex-M0+内核
- 2.0至3.6V电源
- RAM最大化
- 1%内部时钟
- 直接存储器访问 (DMA)
- 通信外设



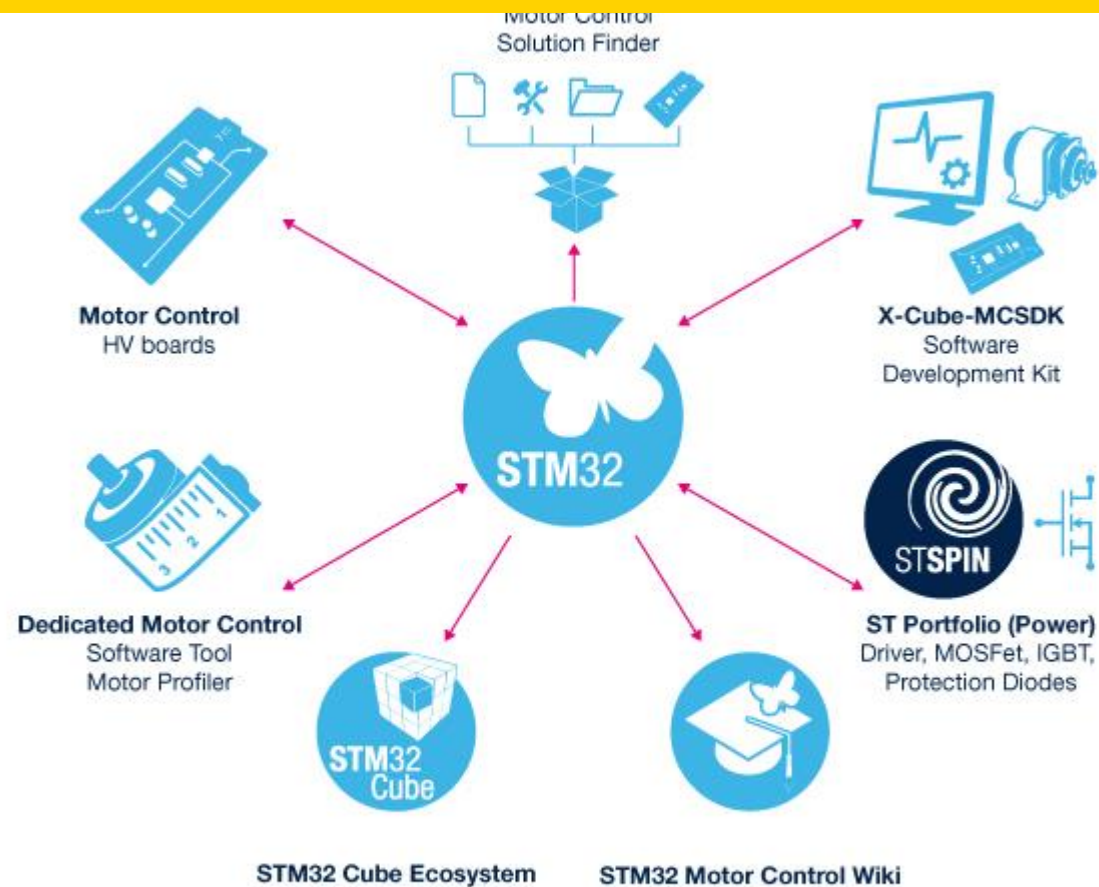
- 定时器
- 实时时钟
- I/O端口最大化
- 12位超快速ADC
- 安全特性



# 用于电机控制的STM32H7功能

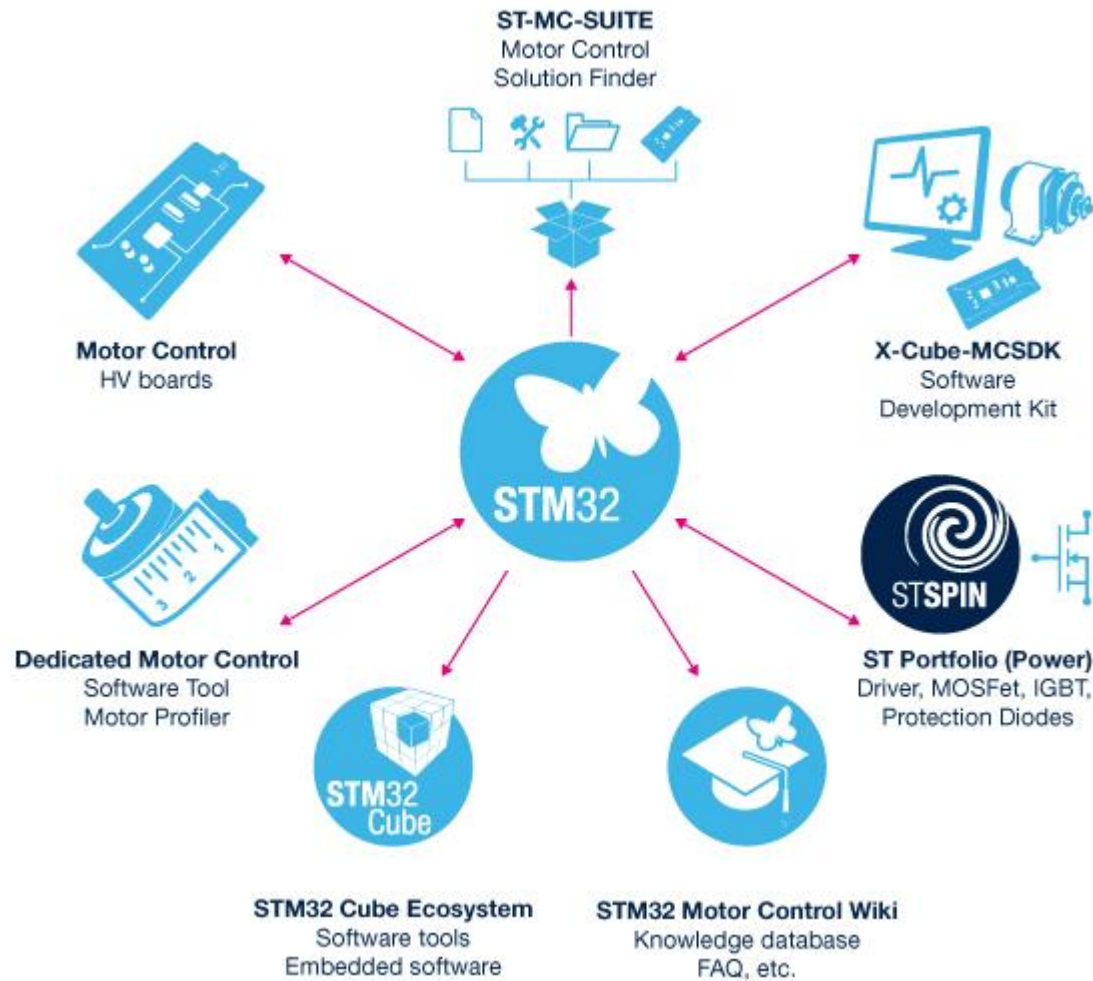
特性	STM32H723/733/725/735/730	优势
内核	Cortex M7	性能与效率
FPU	有	性能与效率
MPU	有	安全
CPU最大频率	550MHz	性能与效率
DMIPS	1177	性能与效率
Flash/SRAM数据大小	128kB至1MB/564kB	性能与集成/成本
包括：ICTM/DCTM RAM	高达256kB（可配置）/128kB	性能与效率
错误代码校正	全存储器映射上的SECDDED	安全
ADC SAR	2x16bit 3.6Msps, 1x12bit 5Msps	效率
其他模拟	2xcomp, 2xPGA, 2xDAC, 1xDFSDM	集成/成本
高级电机控制定时器	2x (275MHz)	性能与效率
缓存与加速器	32kB+32kB L1缓存 显卡、CORDIC、FMAC、Cypro*	性能与效率
安全服务 (SFI与SB-SFU)	有*	系统完整性
封装	VFQFPN68 LQFP100/144/176 BGA100/144/169/176 WLCSP11	成本/集成/灵活性
最大温度范围°C	[-40 ..+125] Tj max 140°C	集成与成本

# X-CUBE-MCSDK更新





# STM32电机控制生态系统



- [X-CUBE-MCSDK](#)
- [ST-MC-SUITE](#)
- 电机分析仪
- [STM32 Cube生态系统](#)
- [STM32电机控制Wiki](#)

# 自X-CUBE-MCSDK5.4.4以来的更新信息



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



- 引入了ST Motor Pilot版本，这是X-CUBE-MCSDK新的监控工具。
- 从Workbench删除了旧的监控器
- 已实施全新的通信协议，并替代了旧版本。

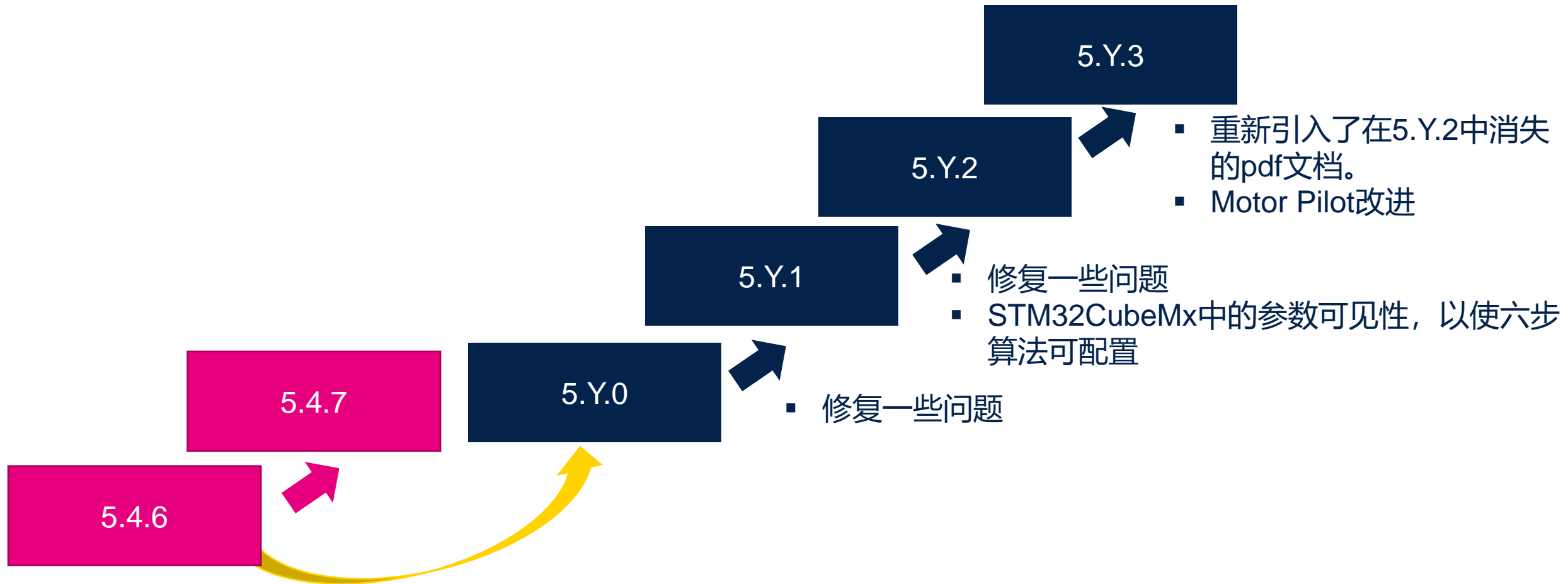
## 对于PMSM/BLDC电机：

- 非连续PWM（即两相调制）
- 可通过Workbench中的固件驱动管理/附加功能选项卡激活过调制
- 支持相移的单电阻。
- Circle Limitation VD: Circle limitation算法的更好变体
- 新增了对STSPIN32G4器件的支持
- 新增了对新电路板的支持
- 新增了对EVALSTDRIVE101电源板的支持
- 新增了对STM32L452和STM32L476器件的HSI时钟源的支持。
- **删除了对STM32F1器件的支持（相应地不再支持使用F1的PFC）**
- 六步示例改进

## 对于异步电机：

- 作为采用FOC无传感器和V/f（标量）模式的两个示例，支持ACIM电机。图形化PC工具随SDK一起提供，以帮助配置此示例：ACIM GUI。两个示例专为NUCLEO-G431RB + STEVAL-IHM023V3配置而设计。

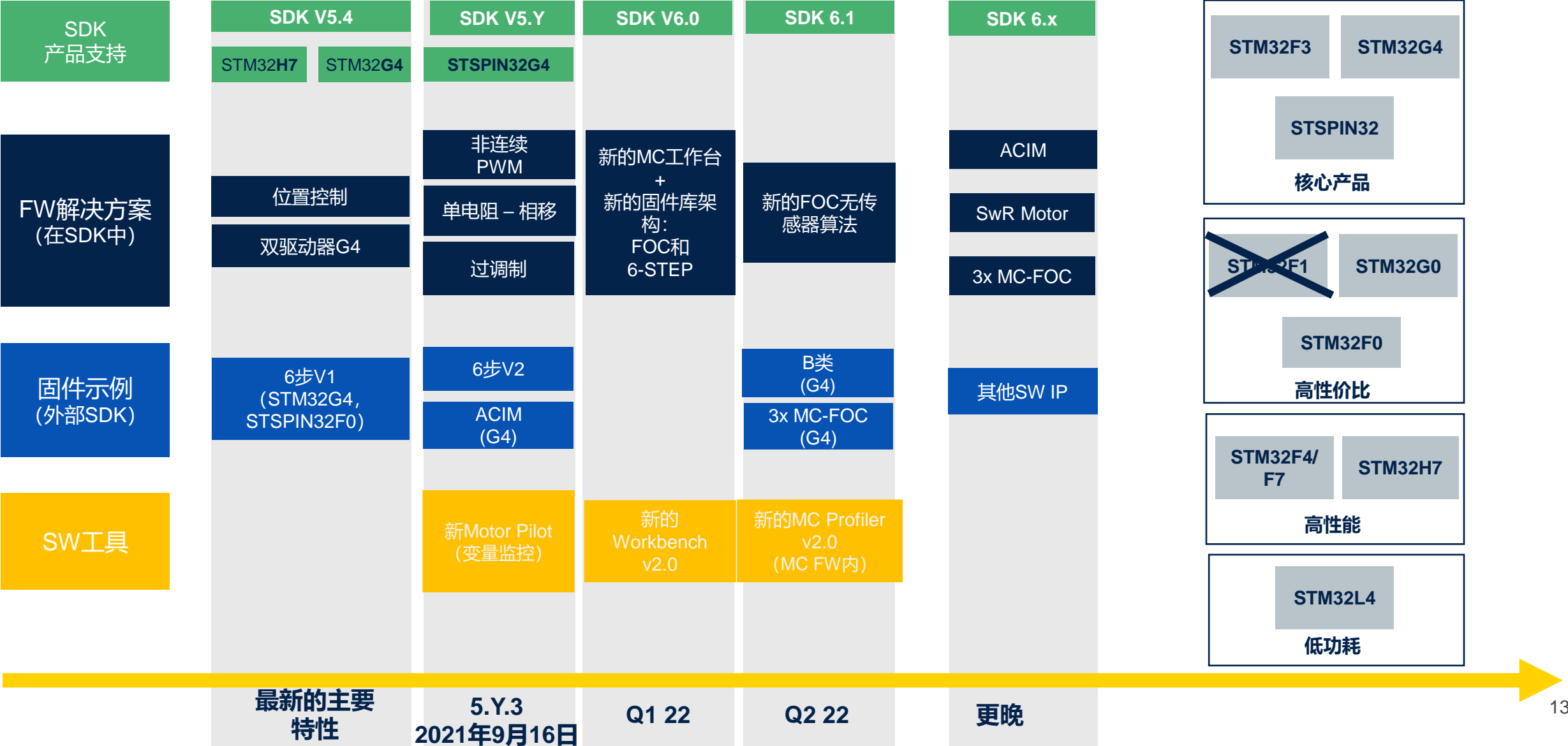
# X-CUBE-MCSDK 5.Y(2/2)







# 电机控制 – SDK路线图概览

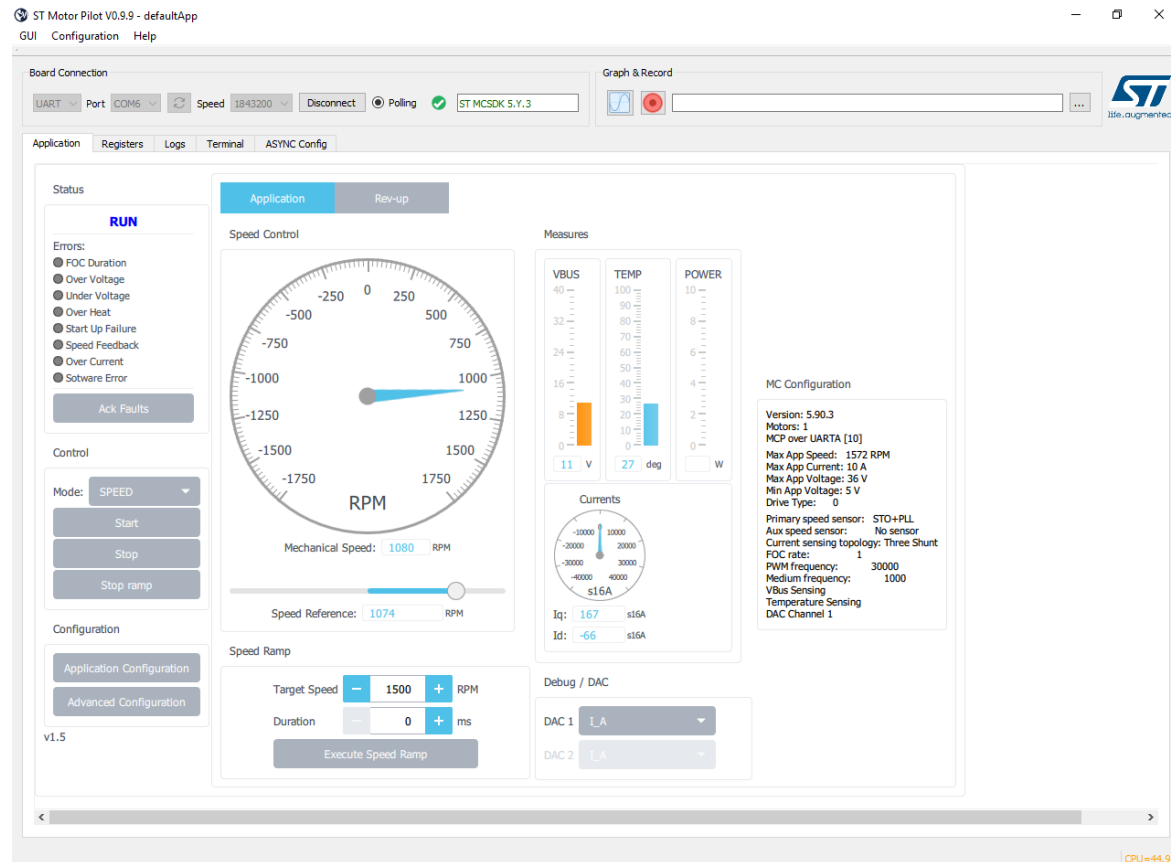


文档编号	标题
<a href="#">UM2374</a>	STM32电机控制SDK v5.0入门
<a href="#">UM2392</a>	STM32电机控制SDK5.x - 固件
<a href="#">UM2380</a>	STM32电机控制SDK v5.2工具
<a href="#">AN5143</a>	如何将电机控制应用程序软件从 SDK v4.3 迁移至 SDK v5.x
<a href="#">AN5166</a>	STM32 MC SDK v5.0电源板的控制和自定义指南

# X-CUBE-MCSDK 5.Y.3演示

# STM32 MC Motor Pilot

## STM32电机控制应用的监控工具



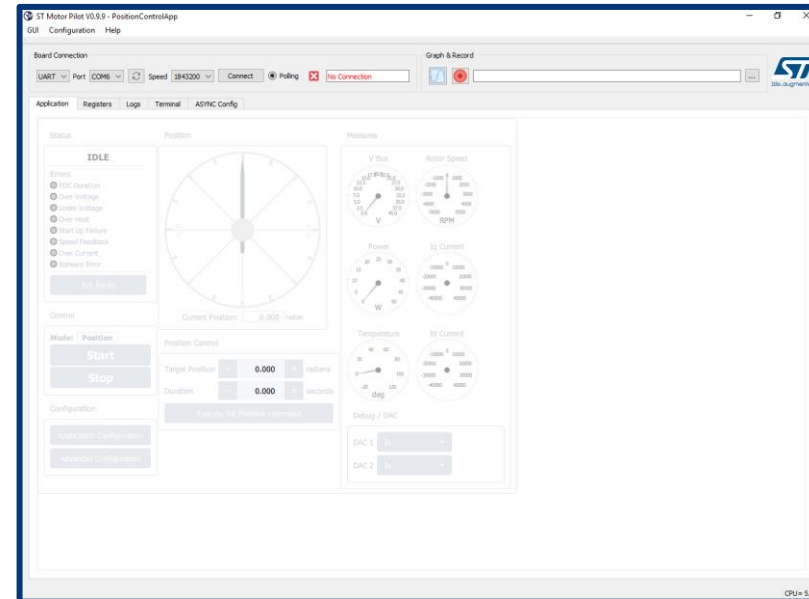
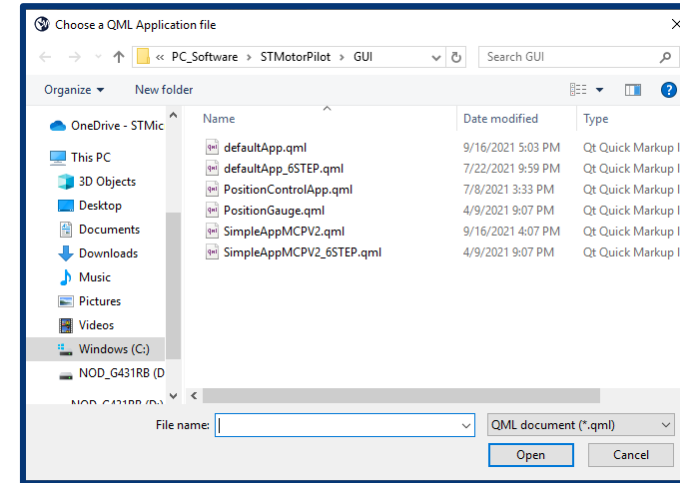
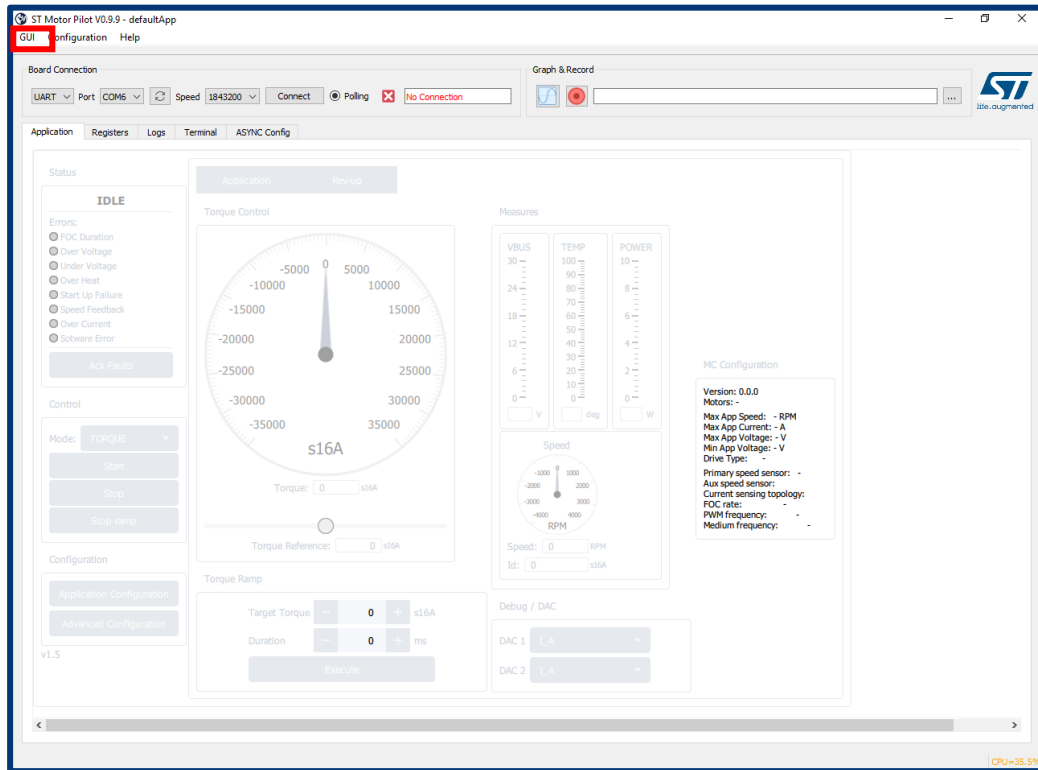
- 通过串行端口连接至基于UI模块的电机控制应用。
- 允许控制、监控和调试电机控制应用。
- 将替代STM32 MC工作台的监控器部分。



在全部三大MCD目标平台上运行：Windows、Mac和Linux

- 增强型绘图功能：用户现在可以绘制大多数寄存器
- 用户可轻松定制GUI
  - 可满足特定需求或试用新的固件功能
- 为支持将来的固件功能奠定了坚实的基础
  - ACIM、6步、传感器零速度，增强型调试功能

# 多种Motor Pilot应用



# 快速启动

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 V

TEMP: 100 deg

POWER: 10 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%

# 控制电机

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

Application Rev-up

Speed Control  
Speed Reference: 1074 RPM  
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

显示嵌入式固件的版本

显示当前状态和错误

故障确认

使电机旋转

点击停止以使电机停止旋转

点击停止斜坡, 已在结束前使其停止

显示速度、电流和其他信息

转动旋钮, 以设置速度

设置目标速度、持续时间, 并点击应用斜坡

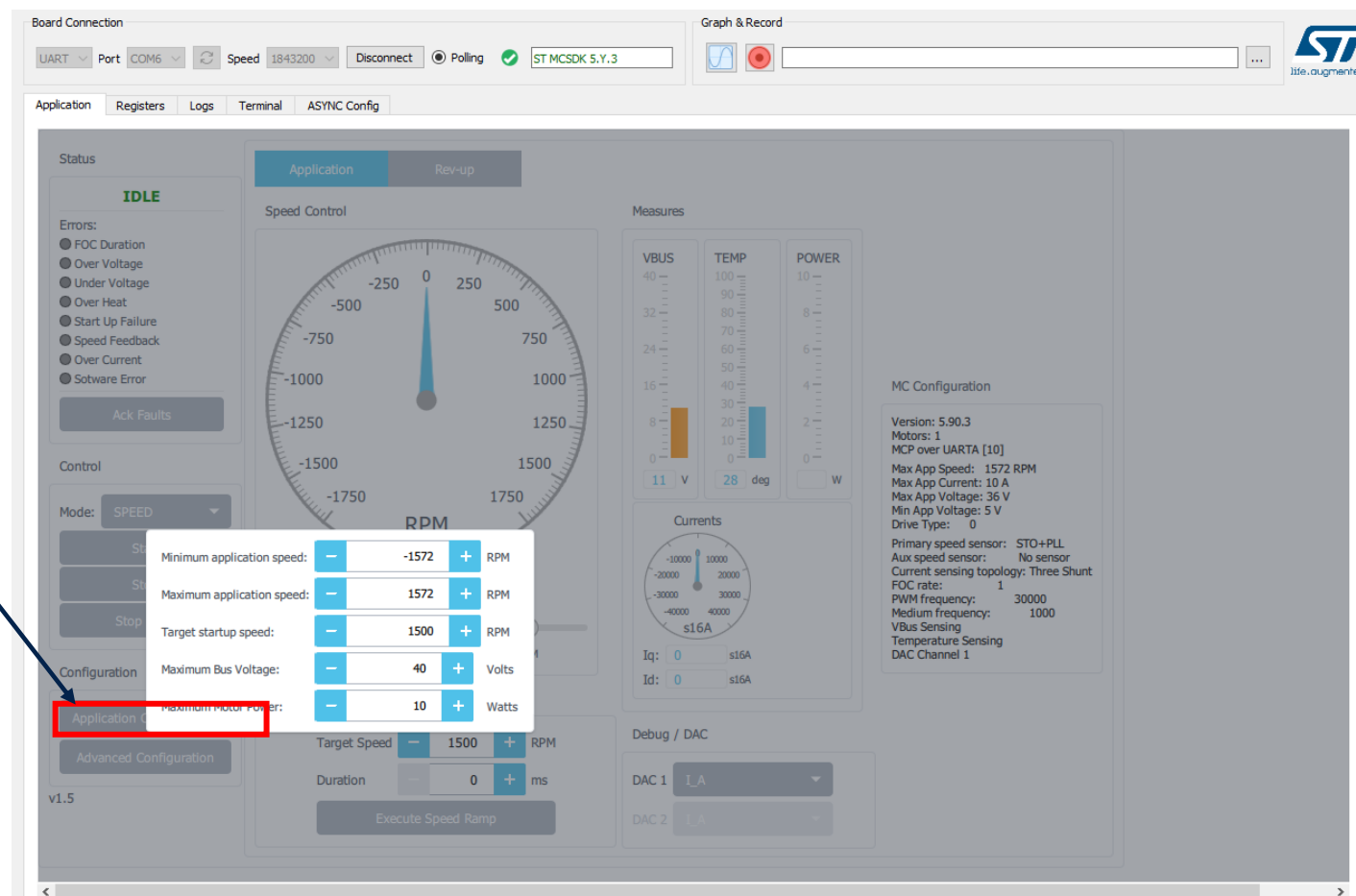
CPU=35.9%



# 电机控制应用参数

STM32 MC Motor Pilot从电路板获取电机控制应用参数，并根据这些参数来调整小部件

电机控制应用  
参数



# 电机控制应用高级设置(1)

速度PID、力矩PID、磁通量PID和磁通量参考值

点击高级配置

The screenshot displays the ST Motor Control GUI interface. At the top, the 'Board Connection' section shows 'UART' selected for the 'Port' (COM6) and 'Speed' set to 1843200. The 'Graph & Record' section is empty. The 'Application' tab is active, showing a status of 'IDLE'. The 'Errors' list includes FOC Duration, Over Voltage, Under Voltage, Over Heat, Start Up Failure, Speed Feedback, Over Current, and Software Error. The 'Control' section shows 'Mode' set to 'SPEED' with 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, 'Mechanical Speed' at 0 RPM, and 'Speed Reference' at 1058 RPM. The 'Measures' section includes 'VBUS' (11 V), 'TEMP' (28 deg), 'POWER' (0 W), and 'Currents' (Iq: 0 s16A, Id: 0 s16A). The 'Speed Ramp' section shows 'Target Speed' at 1500 RPM and 'Duration' at 0 ms. The 'MC Configuration' section lists various parameters like 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' both set to 'I\_A'. The ST logo and 'life.augmented' are in the bottom left corner.

# 电机控制应用高级设置(2)

## 速度PID、力矩PID、磁通量PID和磁通量参考值

The screenshot displays the ST life.augmented motor control software interface. The top bar shows 'Board Connection' with 'UART' selected, 'Port' set to 'COM6', 'Speed' at '1843200', and 'Polling' mode. The 'Graph & Record' section is empty. The main interface is divided into several panels:

- Status:** Shows 'IDLE' status and a list of errors (FOC Duration, Over Voltage, Under Voltage, Over Heat, Start Up Failure, Speed Feedback, Over Current, Software Error). An 'Ack Faults' button is present.
- Control:** Includes a 'Mode' dropdown set to 'SPEED', and buttons for 'Start', 'Stop', and 'Stop ramp'.
- Configuration:** Contains 'Application Configuration' and 'Advanced Configuration' buttons.
- Speed Control:** Features a large RPM gauge, a 'Mechanical Speed' display at 0 RPM, and a 'Speed Reference' slider set to 1058 RPM.
- Measures:** Displays 'VBUS' (11 V), 'TEMP' (28 deg), and 'POWER' (0 W). It also includes a 'Currents' gauge showing 'Iq' and 'Id' at 0 s16A.
- MC Configuration:** Lists motor 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 (highlighted in red):** Contains settings for the 'Speed PI regulator' (Speed Kp: 2714, Speed Ki: 559, Kp divisor: 256, Ki divisor: 16384), 'Torque (Iq) PI regulator' (Torque Kp: 3540, Torque Ki: 2360, Torque Reference: 0), 'Flux (Id) PI' (Flux Kp: 3540, Flux Ki: 2360, Flux Reference: 0), and 'Debug / DAC' (DAC 1: I\_A, DAC 2: I\_A).

The version 'v1.5' is indicated at the bottom left of the interface.

# 电机控制应用高级设置(3)

## 状态观察器、PLL参数、CORDIC参数和DAC设置

The screenshot displays the ST Motor Control GUI with the following components:

- Board Connection:** UART, Port COM6, Speed 1843200, Disconnect, Polling, ST MCDK 5.Y.3.
- Application:** Registers, Logs, Terminal, ASYNC Config.
- Speed Control:** A large RPM gauge showing 0 RPM. Below it, Mechanical Speed: 0 RPM and Speed Reference: 1315 RPM.
- Measures:** VBUS (11 V), TEMP (27 deg), POWER (0 W), and 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.
- Advanced Configuration:** A red box highlights the "Observers" tab, showing the "State Observer with PLL" configuration. The table below shows the parameters:

	-	Value	+	Unit
C1:	-	22528	+	N/A
C2:	-	31533	+	N/A
PLL Kp:	-	195	+	dpp/s16V
PLL Ki:	-	4	+	dpp/s16V

Below the Advanced Configuration, a red box highlights the "Debug / DAC" section, showing the DAC settings:

DAC	Value
DAC 1	I_A
DAC 2	I_A

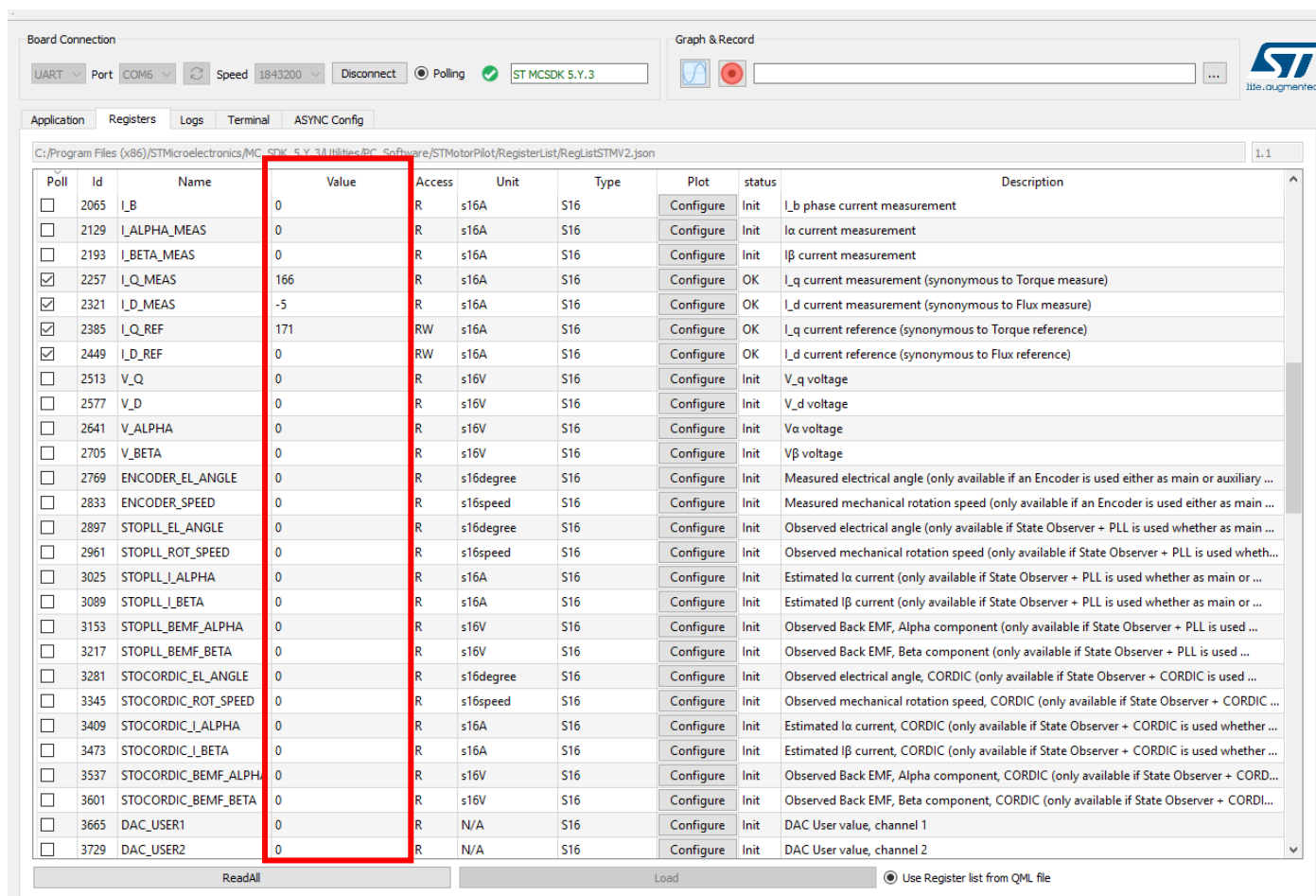
状态观察器 + PLL参数  
状态观察器 + CORDIC参数

DAC设置



# 通过轮询来查看寄存器（低速绘图）

点击“寄存器”选项卡可显示所有寄存器的列表，该列表可流向绘图



The screenshot displays the ST MotorPilot software interface. The 'Registers' tab is selected, showing a list of registers. A red box highlights the 'Value' column, which contains numerical data for each register. The interface includes a 'Board Connection' section at the top with settings for UART, Port, Speed, and a 'Polling' checkbox. The 'Graph & Record' section is also visible. The register list includes columns for Poll, Id, Name, Value, Access, Unit, Type, Plot, status, and Description.

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 $\alpha$ current measurement
<input type="checkbox"/>	2193	I_BETA_MEAS	0	R	s16A	S16	Configure	Init	I $\beta$ 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 $\alpha$ voltage
<input type="checkbox"/>	2705	V_BETA	0	R	s16V	S16	Configure	Init	V $\beta$ 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 $\alpha$ 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 $\beta$ 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 $\alpha$ 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 $\beta$ 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

# 通过轮询来绘制寄存器（低速绘图）

用于异步绘图的寄存器选择可供使用

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

Graph & Record

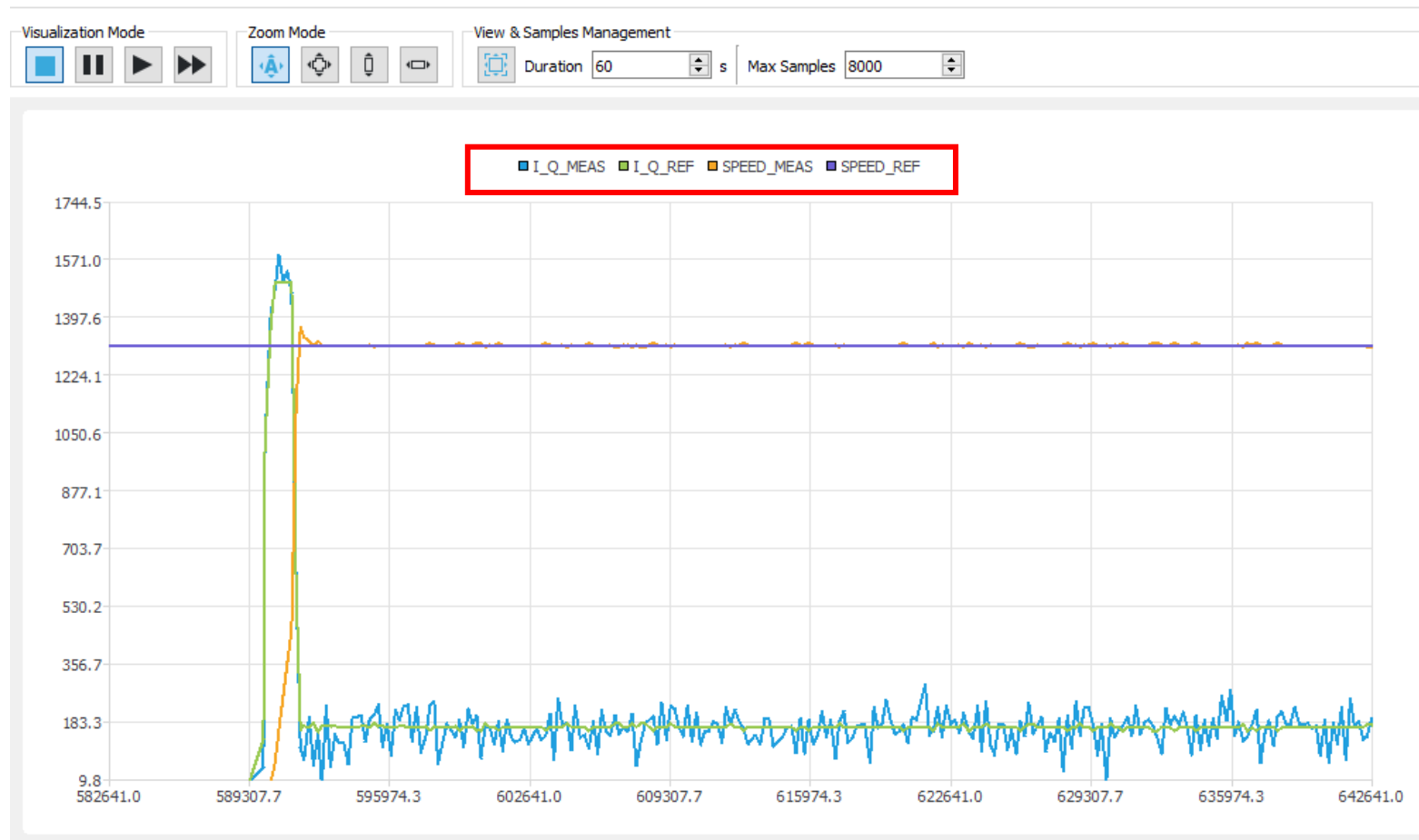
Application Registers Logs Terminal ASYNC Config

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

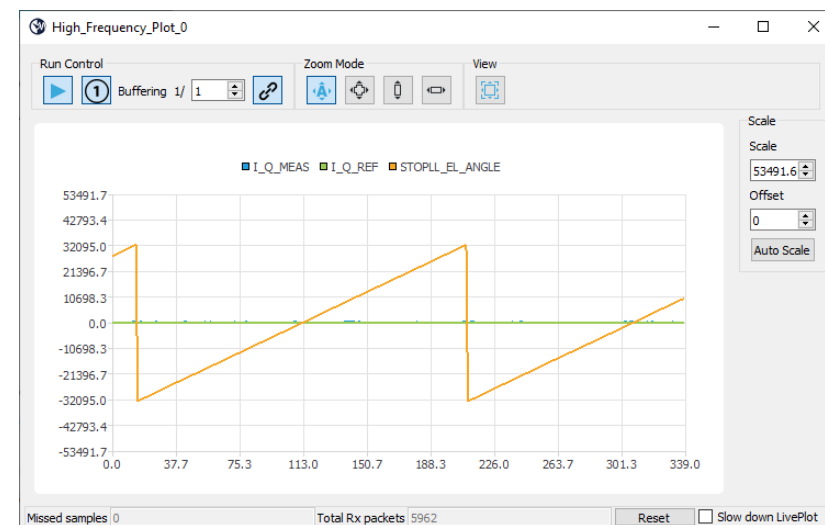
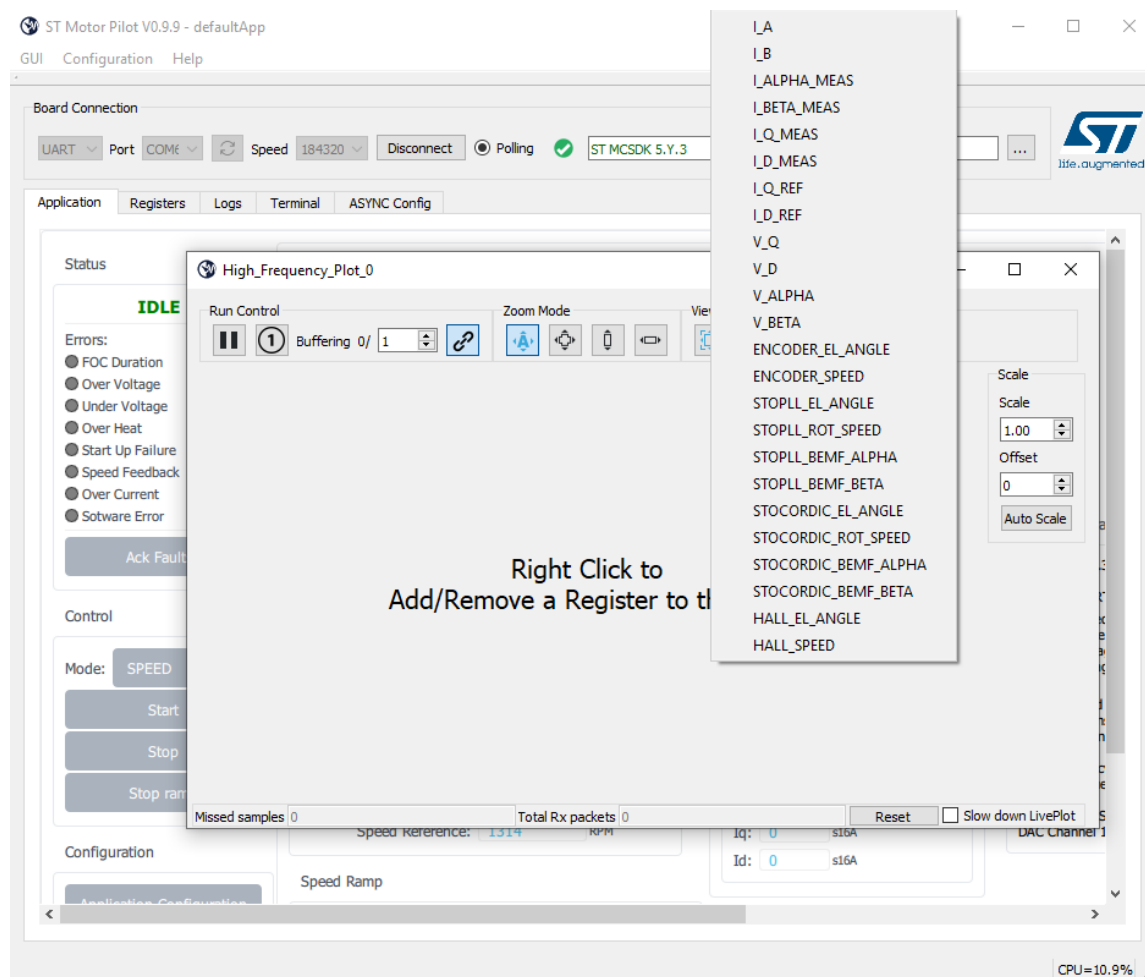
ReadAll Load Use Register list from QML file

# 通过轮询来绘制寄存器（低速绘图）



# 数据记录服务

提供类似于示波器的显示，以绘制高频任务



# X-CUBE-MCSDK的要点

## 同时驱动一个或两个不同的电机（对于6步只有1个）

- PC软件应用可自动测量PMSM电机的机电参数（仅限STM32F30x和STM32F4xx）；
- 评估板的LCD屏幕不支持；
- 开发工具链：
  - 面向ARM（IAR系统AB）v8.20.2的IAR嵌入式工作台（不支持v7.x.x）
  - 面向Arm®（Keil® MDK）v5.24.2的µVision® IDE
  - STM32CubeIDE v1.6.1
  - STM32CubeProgrammer 2.6.0

## X-CUBE-MCSDK版本5.Y的发布为电机控制SDK的开发指明了方向

- X-CUBE-MCSDK版本5.Y不支持STM32F1系列。如果您使用的是STM32F1 MCU，请继续使用X-CUBE-MCSDK 5.4.x版本。
- 目前的X-CUBE-MCSDK版本5.Y不支持双驱动器。如果您使用的是双驱动器，请继续使用X-CUBE-MCSDK 5.4.x版本。
- 之前的X-CUBE-MCSDK版本生成的项目将不能载入到版本5.Y。如果您希望保持兼容性，请继续使用版本5.4.x。
- X-CUBE-MCSDK版本5.Y并未达到与旧的X-CUBE-MCSDK版本5.4.6相同的成熟度水平



## SPEED\_UNIT (从版本v5.4.0开始)

之前，设定或返回速度的API函数（例如MC\_ProgramSpeedRampMotor1()或MC\_GetMecSpeedAverageMotor1()）所使用的速度单位为

- 01Hz（十分之一赫兹）

现在可以为这些函数使用其他单位。版本5.4.0中提供了两个新的速度单位：

- RPM（每分钟转数）
- 001Hz（百分之一赫兹）

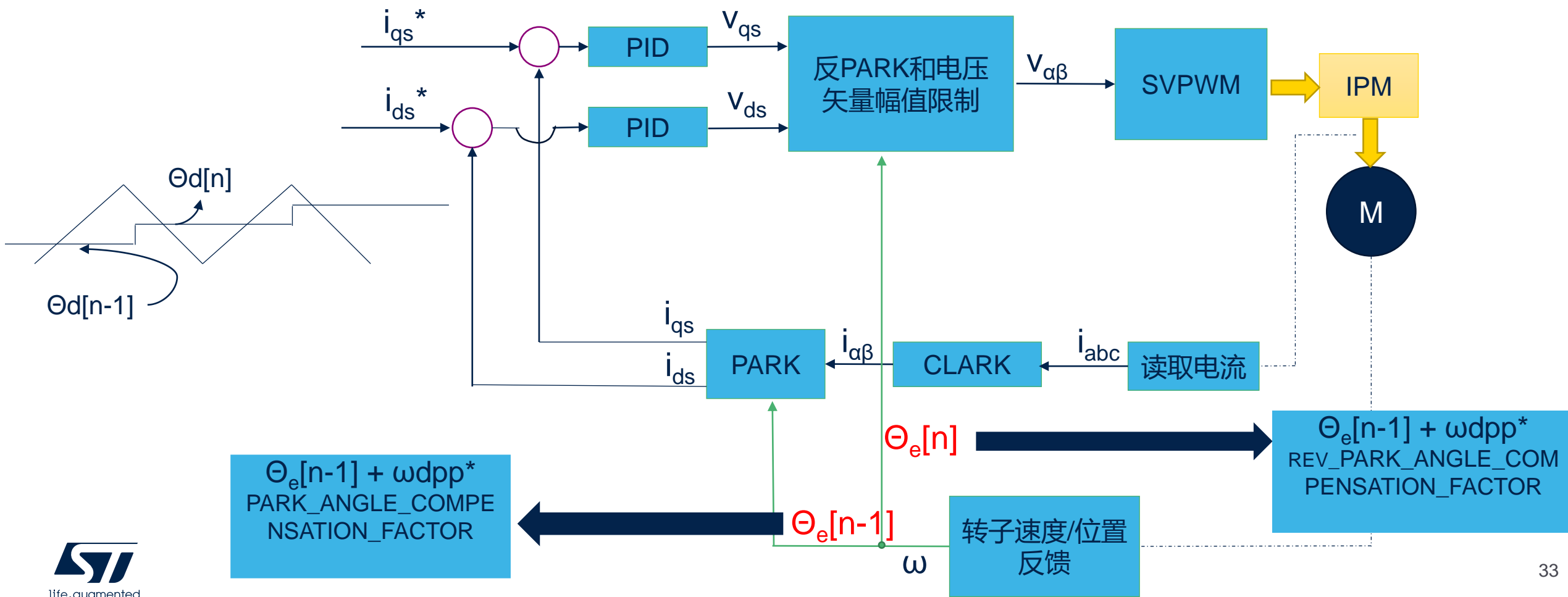
在编译时通过在mc\_stm\_types.h文件中将SPEED\_UNIT符号设为适当的值来选择速度单位：

- \_RPM
- \_001HZ
- \_01HZ

SPEED\_UNIT定义放在用户部分中，并在项目重新生成后仍可保留。

## 要点 (4)

### 无传感器的电角度补偿 (从版本v5.4.0开始)



# Our technology starts with You



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