# 1. Introduction

This document is the entry point to the reference documentation of the **STM32 Motor Control Firmware, version 6.3.2**.

STM32 motor control software development kits (SDKs) designed for, and to be used with, STM32 microcontrollers. The SDKs contain a software library that implements the Field Oriented Control (FOC) and the Six-Step methods to drive 3-phase permanent magnet synchronous motors (PMSMs), both surface mounted (SMPMSM) and interior (I-PMSM).

The STM32 family of 32-bit Flash microcontrollers is specifically developed for embedded applications: STM32F0, STM32C0, STM32F3, STM32G0, STM32G4, STM32F4, STM32L4, STM32H7, STM32F7 and STM32H5. These microcontrollers combine high performance with first-class peripherals that make them suitable for performing three-phase motor FOC.

The Motor Control library can be used to quickly evaluate ST microcontrollers, to complete ST application platforms, and to save time when developing motor control algorithms to be run on ST microcontrollers. It is written in the C language, and implements the core motor control algorithms, as well as sensor reading/decoding algorithms and sensor-less algorithms for rotor position reconstruction. This library can be easily configured to make use of the STM32F30x's and STM32G4's embedded advanced analog peripherals (fast comparators and programmable gain amplifiers (PGAs)) for current sensing and protection, thus simplifying application boards.

The library can be customized to suit user application parameters (motor, sensors, power stage, control stage, pin-out assignment) and provides a ready-to-use application programming interface (API). A PC graphical user interface, the ST motor control workbench, allows complete and easy customization of the library. Thanks to this, the user can run a PMSM or BLDC motor in a very short time.

The STM32 motor control SDK is delivered as an expansion pack for the STM32 CubeMX tool, and the FOC & Six-Step library is based on the STM32 Cube Firmware libraries.

The list of supported STM32 microcontrollers is provided in the release note delivered with the SDK

# 2. STM32 motor control SDK overview

## Package content and installation

The STM32 MC SDK contains the following items:

- STM32 MC firmware
- STM32 MC Workbench (STMCWB)
- STM32 MC Board Manager (STMCBM)
- STM32 MC Board Designer (STMCBD)
- STM32 MC Pilot (including the MC Profiler tool)
- The reference documentation of the STM32 MC firmware (the present document) and a few other

This package is provided as an executable that installs all the items mentioned above on the user’s computer.

The STM32 MC SDK depends on STM32Cube and STM32CubeMx. Hence, The latest STM32CubeMx version must be installed before the SDK. More information about STM32CubeMx is available at ST web site.

**Note:** *STM32CubeMx must be run at least once before the MC SDK can be installed*

## Motor control application workflow

The design of a MC software application that uses the STM32 MC SDK typically starts with the MC WB. With this tool, users configure the MC SDK according to the characteristics of their motor, their power stage, their control stage and the chosen STM32 MCU.

Based on these characteristics, MC WB chooses the appropriate firmware components from the PMSM FOC or 6Step library, computes their configuration parameters, produces a STM32CubeMx project file (referred to as the IOC file from now on, due to its name terminated by the .ioc extension.) and executes STM32CubeMx with this project. The result of this execution is the generation of a complete software project that contains the source code and libraries needed to spin the motors of the application. This software project can be directly opened in the IDE chosen in the workbench.

## Getting Started

The following documents will help the user to start using the STM32 MCSDK:

- **Getting Started with ST Motor Control SDK**
- Motor Control Workbench User Manual
- Motor Pilot Startup Guide
- HSO Startup Guide

Then, the User Manual section will provide more in-depth information on the features and the operation of the firmware. More especially:

- The **STM32 motor control SDK overview** article provides information on the workflow of the SDK that is valid both for FOC and Six Step drives
- The **Introduction to the PMSM FOC drive** page is the starting point for Field Oriented Control on the MCSDK
- And the **Six-step Firmware Algorithm** document details the Six Step implementation of the MCSDK.

Finally, the firmware components that make the SDK are themselves documented in the Components section.