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## Migrating graphics middleware projects from STM32CubeMX 5.4.0 to STM32CubeMX 5.5.0

### Introduction

As of version 5.5.0 of [STM32CubeMX](#), the *Graphics Framework* options are unavailable from the middleware section.

This document describes how to migrate STM32CubeMX V5.4.0 projects that use the graphics middleware ([STemWin](#) or [TouchGFX](#)) to STM32CubeMX V5.5.0. For TouchGFX, it requires the separate installation and activation of the TouchGFX Generator from the [X-CUBE-TOUCHGFX](#) Expansion Package using the STM32CubeMX *Additional Software* feature. STemWin is no longer supported directly through STM32CubeMX from version 5.5.0.



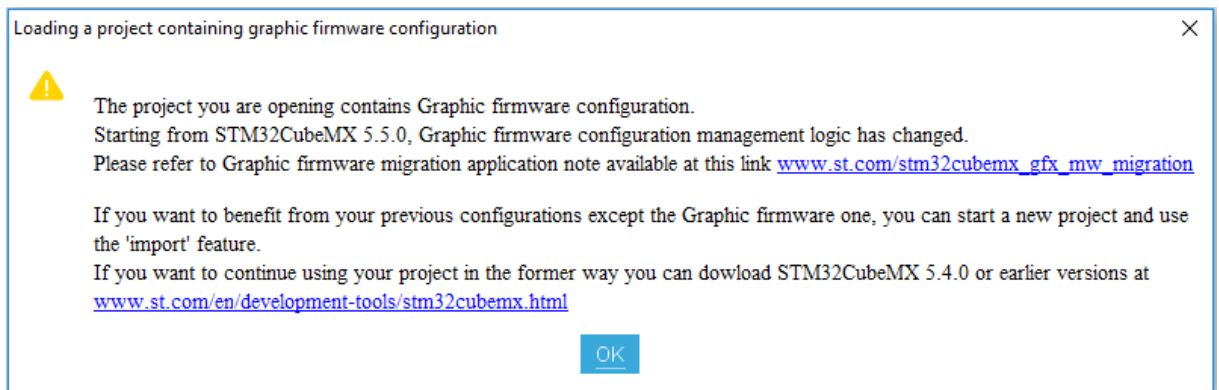
# TouchGFX



## 1 Importing projects from STM32CubeMX V5.4.0 into V5.5.0

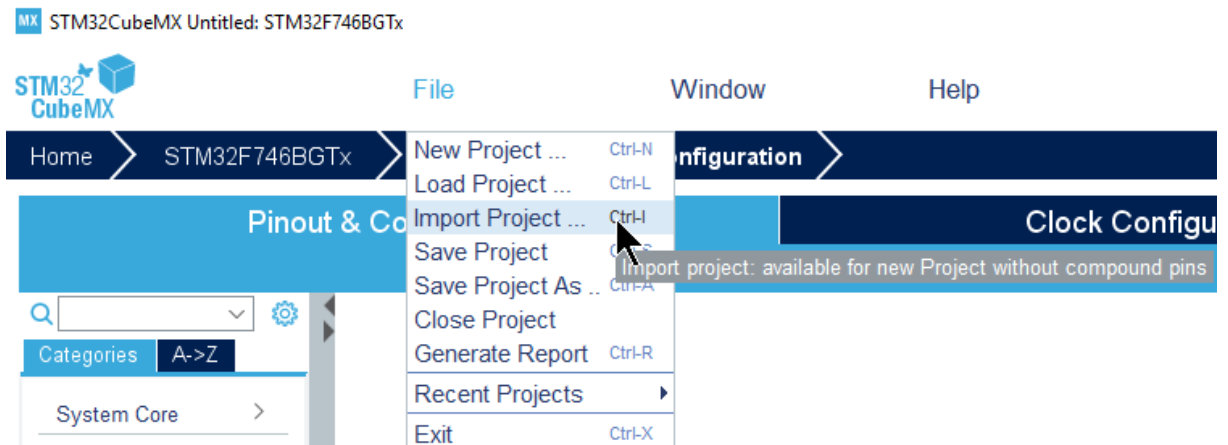
The projects that use the TouchGFX graphics middleware component from STM32CubeMX V5.4.0 cannot immediately migrate to STM32CubeMX V5.5.0. When attempting to open an STM32CubeMX V5.4.0 project with TouchGFX enabled in STM32CubeMX V5.5.0, the warning message about graphic firmware configuration shown in [Figure 1](#) is displayed.

**Figure 1. Graphic firmware configuration warning message**



This message instructs to import (refer to the **[File]>[Import Project]** selection shown in [Figure 2](#)) the peripheral configuration of the 5.4.0 project to a new STM32CubeMX V5.5.0 project based on the same STM32 microcontroller as the 5.4.0 project. A warning is issued otherwise.

**Figure 2. Import project**



Navigate to the 5.4.0 project using the import function, after which a list of available peripherals is presented. Once the desired peripheral configurations are imported, follow the instructions for either TouchGFX or STemWin as shown in [Figure 3](#).

**Figure 3. Import instructions**

Import MX Settings
 

- Import Power Consumption Calculator Settings
- Import Project Settings

Import Pinout/Clock Configuration/Configuration Settings
 

- Automatic Import
- Manual Import
  - Import Pinning Status
  - Import Peripherals Configuration

Peripheral List
 

From STM...	To STM32F746BGTx
CORTEX_...	<input checked="" type="checkbox"/> CORTEX_M7
CRC	<input checked="" type="checkbox"/> CRC
DMA2D	<input checked="" type="checkbox"/> DMA2D
FMC	<input checked="" type="checkbox"/> FMC
FREERTOS	<input checked="" type="checkbox"/> FREERTOS
LTDC	<input checked="" type="checkbox"/> LTDC
NVIC	<input checked="" type="checkbox"/> NVIC
QUADSPI	<input checked="" type="checkbox"/> QUADSPI
...	<input checked="" type="checkbox"/> ...

Try Import
Show View

Pinout ▼

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## 2 STM32CubeMX V5.5.0 and TouchGFX

In STM32CubeMX V5.4.0, the TouchGFX support requires the following setting:

- CRC enabled (restriction also applies to 5.5.0)
- STM32F4 Series or STM32F7 Series
- LTDC/FMC/DSI display interface
- FreeRTOS™
- DMA2D enabled
- FMC/SDRAM enabled
- QUADSPI enabled

In STM32CubeMX V5.5.0, it is possible to configure TouchGFX with little restrictions for almost any STM32 microcontroller (except dual-core [STM32H7 Series](#) MCUs for which the *Additional Software* option is not available). More about the creation of TouchGFX applications using any display interface on any memory configuration is provided in the user guide available from **[RESOURCES]>[HELP CENTER]** in the TouchGFX website at [www.touchgfx.com](http://www.touchgfx.com).

Graphics middleware in STM32CubeMX V5.4.0 uses multiple modes for TouchGFX graphics middleware:

1. *Display Parallel Interface using LTDC*
2. *Display Parallel interface using FMC*
3. *Display Serial Using LTDC+DSIHOST*

In the case of LTDC+DSIHOST, it leads to copying a very specific, non-portable configuration into the user application. In STM32CubeMX V5.5.0 used together with TouchGFX as *Additional Software*, two kinds of display interfaces are supported.

1. *Parallel RGB Interface (LTDC)*
2. *Custom Display Interface*

The LTDC configuration remains identical to STM32CubeMX V5.4.0 for the STM32F4 Series, STM32F7 Series, and STM32H7 Series. Going beyond LTDC as a display interface, users are required to choose *Custom Display Interface*. The TouchGFX user guide explains how to support custom display interfaces like LTDC+DSIHOST, FMC + 8080, FMC + 6800, and SPI.

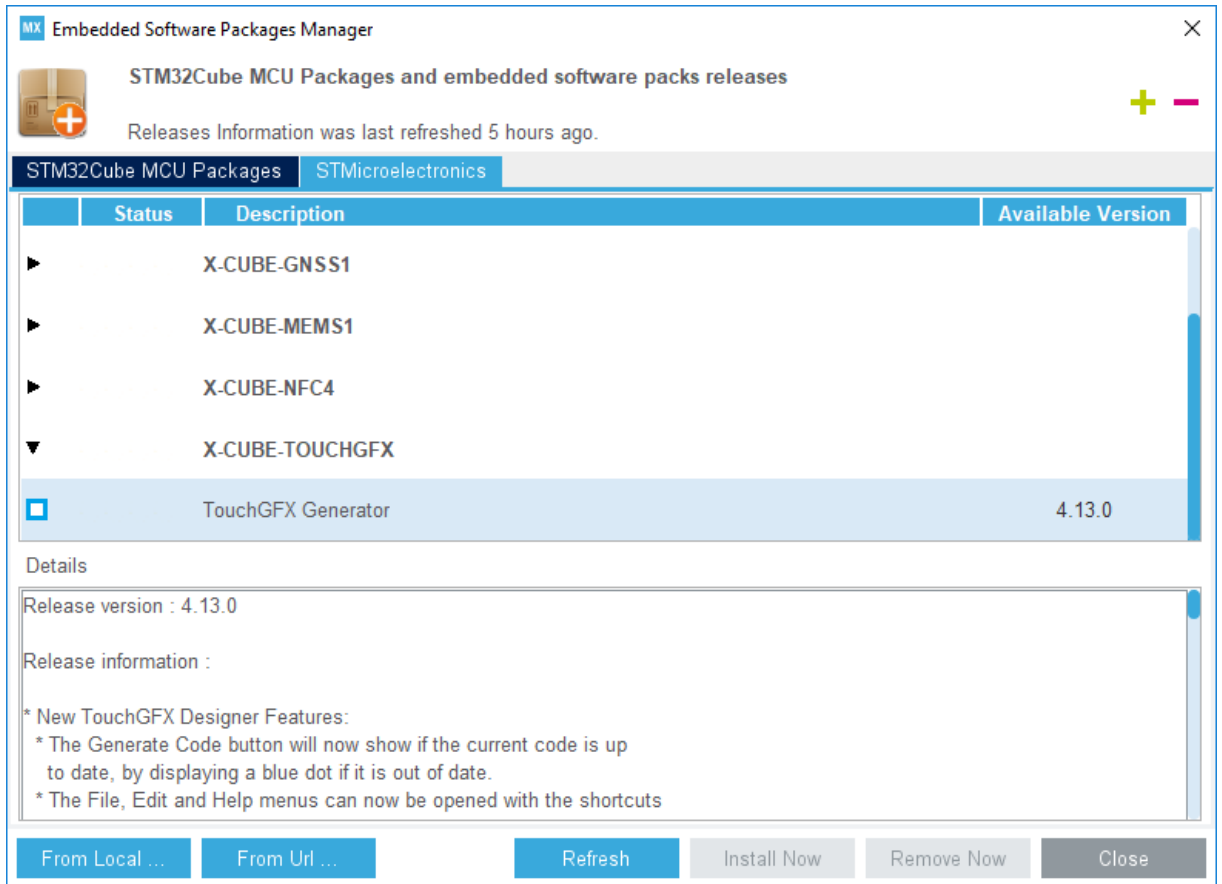
From within STM32CubeMX V5.5.0, it is not possible any longer to configure the following features using TouchGFX Generator:

1. Bitmap caching
2. MCU instrumentation

These configurations are handled in the user code. Refer to the TouchGFX user guide for further details.

After importing the peripheral configuration, install TouchGFX from [Help]>[Manage Embedded Software Packages], *STMicroelectronics* tab as shown in Figure 4.

Figure 4. Installation screen



After the installation, the TouchGFX Generator is available for use as an *Additional Software* for the project. Refer to the TouchGFX user guide for further details.

### Summary

The use of STM32CubeMX V5.5.0 removes several restrictions, allowing users to configure TouchGFX directly through STM32CubeMX for various combinations of hardware and software. As a prime example, using TouchGFX Generator no longer requires other software components such as FreeRTOS™.

TouchGFX features no longer available after migrating to STM32CubeMX V5.5.0:

- LCD screen driver is no longer specified if DSIHOST is configured. It is not possible any longer to select the OTM8009A LCD and configure it either in landscape or portrait mode.
- BitmapCache is no longer configurable through STM32CubeMX.
- MCU Instrumentation is no longer configurable through STM32CubeMX.
- Direct placement of frame buffer in SDRAM banks is no longer available.
- Launching TouchGFXDesigner ([TouchGFXDesigner](#)) from within STM32CubeMX is no longer supported.

STM32CubeMX V5.5.0, it is possible to:

- Configure TouchGFX for most hardware configurations.
- Configure partial frame buffers.
- Choose a pixel format for the frame buffer (no longer dependent on LTDC).
- Override generated configuration through the architecture of the generated code.
- Work with STM32CubeMX and TouchGFX Designer open simultaneously.

Guidance on how to achieve the above with STM32CubeMX V5.5.0 is provided in the TouchGFX user guide.

### 3 STM32CubeMX V5.5.0 and STemWin

STemWin is no more supported by STM32CubeMX from version 5.5.0. To migrate an old STemWin project to STM32CubeMX V5.5.0, make sure to have the STemWin project generated by STM32CubeMX V5.4.0 available, as the migration requires the manual copy of some of its files into the new generated project folder.

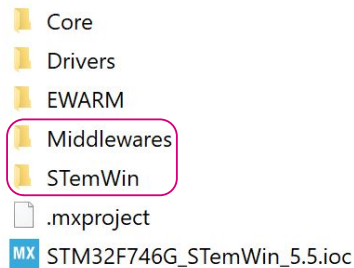
After having imported the peripheral configurations from the STM32CubeMX V5.4.0 project into the target STM32CubeMX V5.5.0 project, apply the following steps:

1. Make sure that all peripherals are configured in the new 5.5.0 project as they were in the old 5.4.0 project
2. Check the configuration of the clocks and reconfigure if needed
3. Generate the code and select the **[open folder]** button
4. Operate as instructed in:
  - a. [Section 3.1 Project folder configuration](#)
  - b. [Section 3.2 File updates](#)
  - c. [Section 3.3 IAR project configuration](#)

#### 3.1 Project folder configuration

Copy the `Middlewares` and `STemWin` folders shown in [Figure 5](#) to the new generated project.

**Figure 5. Middlewares and STemWin folders**



## 3.2 File updates

### main.h

In folder `Core/inc`, add the following include files instructions:

```
#include "GUI.h"  
#include "HW_Init.h"  
#include "GUI_App.h"  
#include "STemwin_wrapper.h"
```

### main.c

In folder `Core/src`, delete all functions and handles definitions that are already defined in STemWin configuration files, such as:

```
DMA2D_HandleTypeDef hdma2d;  
LTDC_HandleTypeDef hltdc;  
SDRAM_HandleTypeDef hsdrml;  
  
static void MX_DMA2D_Init(void);  
static void MX_FMC_Init(void);  
static void MX_LTDC_Init(void);
```

Replace with the graphic function prototypes:

```
extern void GRAPHICS_HW_Init(void);  
extern void GRAPHICS_Init(void);  
extern void GRAPHICS_MainTask(void);
```

Delete the initialization functions in function `main`:

```
MX_DMA2D_Init();  
MX_FMC_Init();  
MX_LTDC_Init();
```

Replace with graphic initialization functions in user code area:

```
/* Initialise the graphical hardware */  
GRAPHICS_HW_Init();  
/* Initialise the graphical stack engine */  
GRAPHICS_Init();  
/* Graphic application */  
GRAPHICS_MainTask();
```



**stm32f7xx\_hal\_msp.c**

Remove the hardware MSP initialization functions related to graphic tasks that are already configured in STemWin file HW\_Init.c, such as:

```

DMA2D
void HAL_DMA2D_MspInit(DMA2D_HandleTypeDef* hdma2d)
void HAL_DMA2D_MspDeInit(DMA2D_HandleTypeDef* hdma2d)

LTDC
void HAL_LTDC_MspInit(LTDC_HandleTypeDef* hltdc)
void HAL_LTDC_MspDeInit(LTDC_HandleTypeDef* hltdc)

FMC
static void HAL_FMC_MspInit(void)
static void HAL_FMC_MspDeInit(void)

SDRAM
void HAL_SDRAM_MspInit(SDRAM_HandleTypeDef* hsdram)
void HAL_SDRAM_MspDeInit(SDRAM_HandleTypeDef* hsdram)
  
```

**stm32f7xx\_it.c**

Add the GRAPHICS\_IncTick function prototype as extern:

```

/* USER CODE BEGIN EV */
extern void GRAPHICS_IncTick(void);
/* USER CODE END EV */
  
```

Insert GRAPHICS\_IncTick call in SysTick\_Handler:

```

/* USER CODE BEGIN SysTick_IRQn 0 */
  GRAPHICS_IncTick();
/* USER CODE END SysTick_IRQn 0 */
  
```

### 3.3 IAR™ project configuration

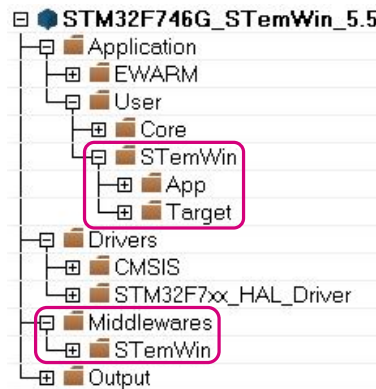
#### Add include paths

```
$PROJ_DIR$/../STemWin/Target
$PROJ_DIR$/../STemWin/App
$PROJ_DIR$/../Middlewares/ST/STemWin/inc
```

#### Create new groups

- **Middlewares**
  - **STemWin** under group Middlewares
- **STemWin** under group User
  - **App** under group STemWin
  - **Target** under group STemWin

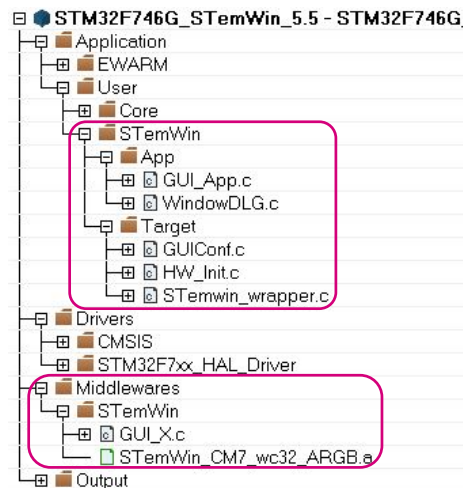
Figure 6. New group creation



#### Insert files

- Insert the application files under App
- Insert the STemWin configuration files under Target
- Insert the STemWin library and GUI\_X.c files under group Middlewares

Figure 7. File insertion



## Revision history

**Table 1. Document revision history**

Date	Version	Changes
13-Jan-2020	1	Initial release.

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