# RUNNING A PROJECT ON THE MACC CONTROLLER WITH A PC BASED HMI:

### Hardware Introduction:

The Motion Automation Control Card (**MACC**) is an embedded controller used to allow Click&Move<sup>®</sup> projects to run with "hard" real time control (RTOS), and provide motion programs a path to their respective servo drives and I/O (via CAN bus or MACCIO cards). Click&Move will also allow project debugging and HMI control through a "Gateway Project" which will typically communicate to the drive via Ethernet port. There are several connections, and protocols that can be supported. See the picture below:



### **Requirements for this Application Note:**

- A familiar servo configuration will be needed (meaning use a pre-integrated motor drive combo in known working condition) and some preliminary ability to generate and configure basic C&M projects is assumed.
- **2.** A working Click&Move project with an HMI running on a PC. It is suggested to start with one of the existing templates. We will use the Two CAN Axes project template in this Application Note
- **3.** Working communication between the PC and the MACC (We will actually set this up as part of the App Note)

### **Setup Networking Hardware**

This section discusses some configuration using Windows, concerning how to get a network card setup to talk properly to the MACC. This is absolutely necessary for Click&Move to work with the MACC. A simple ping test will verify if the hardware is awake and communicating properly. This process is outlined step by step below:

#### Be Aware Which Plug to Use:

Care should be taken in the selection and use of an RJ45 connector applied to the MACC, and PC respectively. The MACC has 2 CAN ports, that will accept a RJ45 plug, DO NOT PLUG ETHERNET INTO CAN. On the computer side, it may be best to have to Network Cards (NIC) installed. IP address configuration for IPv4 will have to take place on at least one of the NIC's if this is done on the wrong card, loss of internet may result.

#### Setting the IP on a Network card:

Start by opening the Network and Sharing center



Select Change adapter settings on the left.



Select the device that is not attached to the internet



Choose properties

| AMC Test Status    | X                  |
|--------------------|--------------------|
| General            |                    |
| Connection         |                    |
| IPv4 Connectivity: | No network access  |
| IPv6 Connectivity: | No network access  |
| Media State:       | Enabled            |
| Duration:          | 06:55:58           |
| Speed:             | 100.0 Mbps         |
| D <u>e</u> tails   |                    |
| Activity           |                    |
| s                  | ent — 🚚 — Received |
| Packets:           | 112 0              |
| Properties S       | Diagnose           |
|                    | Qlose              |

Select IPv4 Properties:

Select Use this IP address. Enter in the **IP address 192.168.100.240** (anything other than 192.168.100.50 will work; 240 is the default for this demo) Enter **for the subnet: 255.255.255.0** 

| Internet Proto                               | col Version 4 (TCP/II   | Pv4) Prop               | erties             |                |                    | ?                  | ×         |
|--|---|-------------------------|--------------------|----------------|--------------------|--------------------|-----------|
| General                                      |   |                         |                    |                |                    |                    |           |
| You can get<br>this capabili<br>for the appr | IP settings assigned a<br>ty. Otherwise, you ne<br>opriate IP settings. | automatica<br>ed to ask | lly if y<br>/our n | our n<br>etwor | etwork<br>'k admir | suppor<br>histrato | rts<br>or |
|  | an IP address autom<br>e following IP address                           | atically                |                    |                |                    |                    | _         |
| <u>I</u> P addres                            | ss:   |                         |                    |                | . :                |                    |           |
| S <u>u</u> bnet m                            | ask:  |                         |                    |                |                    |                    |           |
| <u>D</u> efault g                            | ateway:   |                         |                    |                |                    |                    |           |
| Obtain                                       | DNS server address a  | automatica              | lly                |                |                    |                    |           |
| _⊚ Us <u>e</u> th                            | e following DNS serve   | r addresse              | s:                 |                |                    |                    |           |
| Preferred                                    | DNS server:   |                         |                    |                |                    |                    |           |
| Alternate                                    | DNS server:   |                         | •                  |                |                    |                    |           |
| 🔲 Vaļida                                     | te settings upon exit   |                         |                    |                | Adv                | anced              |           |
|  |   |                         |                    | ОК             |                    | Car                | ncel      |

Plug in the MACC and wait for the system to boot. (1 minute or so)

Connect the Ethernet Port on the MACC to the correct NIC on the computer.

Open a command prompt in Windows (in the run menu type cmd):



Ping the MACC at its default address: 192.168.100.50

If all packets are lost, the connecting is somehow incorrect.

Otherwise, the MACC is alive and you can move to the next step.

## Start with your PC based Project

You should have a working project already tested on the PC with HMI built. For the purposes of this App note, we will be using the Two Axes With CANOpen Network existing template. Its default will have been to have the Compiler set for PCW. The first thing we must do, is to change the compiler for the project to support the MACC. See below:

#### 1. Set options target to MAL-MACC

| 🔁 Cli | ck&N  | /love D                                    | eskto   | op Evalu  | atio | on- C:\CandM\W  | orking_4_2_1\Pro | ects\0 | 01_Ta | rget_ | For_l | Doc |       |           |            | <b>(</b> ) |
|-------|---|--|---------|-----------|------|-----------------|------------------|--------|-------|-------|-------|-----|-------|-----------|------------|------------|
| File  | Proj  | ect) R                                     | un      | Interfac  | e    | Virtual machine | Collected C&N    | applic | ation | То    | ols   | Set | tings | Window    | Help       |            |
|       |   | Build                                      | (com    | pile only | y la | test changes)   |                  |        | ų,    | 虊     | ?     | •   |       | Target pl | atform : P | ĊW         |
|       |   | Rebui                                      | ild (co | omplete   | rec  | ompile)         |                  |        |       |       |       |     |       |           |            |            |
|       |   | Delet                                      | e C&    | M gener   | ate  | d files         |                  |        |       |       |       |     |       |           |            |            |
|       | Open XML property file editor                     |  |         |           |      |                 |                  |        |       |       |       |     |       |           |            |            |
|       |   | Validate all property and config XML files |         |           |      |                 |                  |        |       |       |       |     |       |           |            |            |
|       |   | Open HTML project description file         |         |           |      |                 |                  |        |       |       |       |     |       |           |            |            |
|       | Open HTML FB help file                            |  |         |           |      |                 |                  |        |       |       |       |     |       |           |            |            |
|       | Replace FBD editor (Eagle) settings with defaults |  |         |           |      |                 |                  |        |       |       |       |     |       |           |            |            |
|       |   | Optio                                      | ns      |           |      |                 |                  |        |       |       |       |     |       |           |            |            |
|       |   |  |         | Optio     | ons  | ;               |                  | _      |       |       |       |     |       |           |            |            |

Click this menu item, select a tab and press F1 for help. The topics in this chapter describe various project specific settings.

#### Select MAL and GAL:

| Project options  |  |
|--|--|
| Target platform Desktop options Debugger options Target properties Load path   |  |
| <ul> <li>FMU - FMU (Fujitsu ARM Cortex M3 Microcontroller Card) with MicroC/DS-II</li> <li>MAL - MACC (Motion Automation Controller Card) with Linux</li> <li>PCL - PC with Linux</li> <li>PCW - PC with Microsoft Windows</li> <li>PLA - AMC programmable servo drive platform A</li> </ul> | <ul> <li>BCB - Borland 5.5 command line compiler</li> <li>GAL - ARM CortexA8 compiler</li> <li>GAU - ARM CortexM3 compiler</li> <li>GMU - MicroBlaze compiler</li> <li>GXL - GCC Cross Compiler On Windows for x86 Linux</li> <li>MGW - MinGW32 gcc compiler (Version 3.4.2)</li> <li>MXW - Microsoft Visual C++ Toolkit 2008</li> </ul> |
| Please, download plugins for other supported (gray) platforms!   | Apply  |
| OK Cancel  | Help   |

2. Rebuild the project and note the different compiler:



#### 3.Click File -> Package Collected Application from Project

4. Click File -> Create Gateway

| Gateway project created successfully!  |  |
|--|--|
| What's next?   |  |
| 1. Close the current (parent) project.   | 가장 동안 가장 감독한 것이다. 가장 감독한 것이 없다. ㅋ  |
| <ol><li>Open your newly created gateway pro<br/>current project.</li></ol>                             | iject, in the CMGateway folder of the  |
| 3. Compile the project using the Project   | Rebuild menu.  |
| 4. Optionally edit (from Desktop) the Ro   | ot1.Intf1xClientPort.prop.xml file to  |
| -set the same UDP port as in Root1.Intf1<br>-set the same IP address as in Desktop/F<br>parent project | ServerPort.prop.aml of the parent project<br>hoject/Options/Target properties of the |
| 5. Launch this gateway project with C&I  | M-HMI to connect to the application in   |
| the target device (if it is not running that   | n start it from the parent project).   |
| 5. If you wish to both debug and monito  | or the target application simultaneously:  |
| First create a Collected application from  | n this gateway project.  |
| Go back to your parent project to debu   | g the target application.  |
| -Launch your Collected gateway applica   | ation from the Desktop.  |
| (You can run a collected application fro<br>open.)   | m the desktop while another project is   |
| See also: C&M-MC help\Menu structure<br>project  | r\Desktop Menus\File\Create gateway to   |
|  |  |
|  | OK   |
|  | - On   |

#### 5. Close the Project

#### **Close Current Project**

![](_page_6_Picture_2.jpeg)

6. Open the Gateway project created in Step # 4 (It's inside your project folder)

| Clickouviove Desi             | top Evaluation   |               |
|-------------------------------|--|---------------|
| ile Project Run               | Interface Virtual machine Collected C&M application Tools Setting  Collected C&M application Tools Setting  Copen Project  Open a previously created C&M project. The project then can be edited, run, debugged etc. | s Window Help |
|                               | Open project   | ×             |
| Project name<br>Project thumb | view ON 🔽  |               |
| CMGateway                     |  | •             |
| Project parent o              | directory  | Details >>    |
| C:\CandM\Wo                   | rking_5_3_3\Projects\E4D_prep  |               |
|                               | r.   |               |
| Project director              | r-   |               |

7. Build Gateway Project

![](_page_6_Picture_6.jpeg)

First deletes all files generated by the C&M Compiler. Compile all FBDs (generate C++ and executable code) and creates the associated default Function Block (XML) properties files, unless they already exist. 8. Close the Gateway project

Click File -> Close Project

- 9. Open the Original Project Click File -> Open Project
- 10. Click Collect C&M Application > Create

![](_page_7_Picture_4.jpeg)

11. Select PCW as this will run on the PC:

| Select target                   | ×        |
|---------------------------------|----------|
| Target name                     |          |
| PCW - PC with Microsoft Windows | <b>_</b> |
| ОК                              | Cancel   |

| Application na | ne                       |            |  |
|----------------|--------------------------|------------|--|
| J              |                          |            |  |
| Application pa | ent directory            |            |  |
| C:\CandM\W     | orking_4_2_1\CollectedAp | plications |  |
| New applicatio | n directory              |            |  |
| C-\CandM\W     | nrking 4 2 1\CollectedAn | nlications |  |

**12.** Enter a Unique name for the Collected Application we are creating; Click "OK"

13. Click Add Project. Set the Parent directory to the Projects folder (It will default to the Examples folder)

| Click&Move Desktop EvaluationdM/Working_4_         File       Project       Run       Interface       Virtual machine       Co         The project       Run       Interface       Virtual machine       Co | 1\Projects\001_Target_For_Doc\CMGateway       ■       ■       ×         Ilected C&(M application Tools Settings Window Help         ■       ■       ■       1         ■       ■       ■       1       PCW         ■       ■       ■       1       PCW         Target platform : PCW       Collected Application - 001 Target For Doc COLLECTED       PCW |   |
|---|--|---|
|   | Add project         Add vitual device         Delete         Up         Down         Add project to Application         Project parent directory         [C:\CandM\Working_4_2_1\Projects\00]         Project directory         [C:\CandM\Working_4_2_1\Projects\00]         OK  | Property Files Validate all Help (F1)  Browse for Folder  Select parent directory of application  Select parent directory of application  Can Can Can Can Can Can Can Can Can C |

- 14. Select the CandM\_HMI (ALL\_PCW) file from your project ; Click "OK"
- 15. Click Add Project again and set the parent directory to your project folder as above.
- 16. Choose the CMGateway (MGW\_PCW) gateway file ; Click "OK"

| Add project to Application  |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|
| Project name  |  |  |  |  |  |  |  |
| CMGateway(MGW_PCW)  |  |  |  |  |  |  |  |
| Project parent directory<br>C:\CandM\Working 4 2 1\Projects\001 Target For Doc              |  |  |  |  |  |  |  |
| Project directory:<br>C:\CandM\Working_4_2_1\Projects\001_Target_For_Doc\CMGateway(MGW_PCW) |  |  |  |  |  |  |  |
| OK Cancel   |  |  |  |  |  |  |  |

**17.** Click "OK" at the bottom of the collected application window

| Project                   | s   | Property Files |              |
|---------------------------|---|----------------|--------------|
| Add project E4D_p<br>CMGa | orep_CandM_HMI\1(ALL_PCW)<br>teway\1(MGW_PCW) |                | Setup        |
| Add virtual device        |   |                | Validate all |
| Delete                    |   |                | Help (F1)    |
| Up                        |   |                |              |
| Down                      |   |                |              |
|                           |   |                |              |
|                           |   |                |              |
|                           |   |                |              |
|                           |   |                |              |
|                           |   |                |              |

## **Running your Application**

- \_ 0 X Click&Move Desktop Evaluation- C:\CandM\Working\_5\_3\_3\Projects\E4D\_prep Project Run Interface Virtual machine Collected C&M application Tools Settings Window Help Convert CANOpen DCF to CDS file L 3 ★ - ● • Target platform : MAL Run Application Image Download Server Download Packaged Application to Remote De **Run FTP Client** Download Packaged application to remote device **Fieldbus Settings** Download the Packaged application in the project directory, according the Merge Files settings in "Project/Options/Target properties", via FTP. The remote device may be a MACC (Motion Automation Control Card) or a PC with Linux or Windows OS. Project must be rebuilt for the remote platform before downloading!
- 1. Click Tools -> Download Packaged Application to Remote device

#### 2. Click Run -> Load C&M Package and Run

![](_page_10_Picture_4.jpeg)

#### 3. Click Collected C&M Application -> Run

| File Project Run Interface Virtual machine | Collected C&M application                                     | n Tools Settin  | ngs Window Help  |   |
|--|---|---|--|---|
| <u>B</u> 3 1 1 - ≥ ⊇ 1                     | Create<br>Config<br>Run                                       | ₿ ? •   | Target platform : MAL  | l   |
|  | Delete Run<br>Copy as Run t<br>Close A col<br>Close all appli | the created collect<br>lected application<br>This feature is us<br>cation is communication of the comm | ted application(s) in the def<br>or can be run from the deskt<br>seful for distributed applica<br>nicating (via Ethernet UDP/I | fined sequence.<br>op while another project i<br>tions. E.g. a collected<br>P) with a remote device |

4. Select the name you gave the Collected Application, Click "OK"

| Open application  | x |
|---|---|
| Application name  |   |
| 001_Target_For_Doc_COLLECTED  |   |
| Application parent directory  |   |
| C:\CandM\Working_4_2_1\CollectedApplications                              |   |
| Application directory:  |   |
| C:\CandM\Working_4_2_1\CollectedApplications\001_Target_For_Doc_COLLECTED |   |
| OK Cancel   |   |

5. If everything went well, you should watch the HMI load, the project is running on the MACC, and you can use the HMI to control it.

![](_page_11_Figure_1.jpeg)