

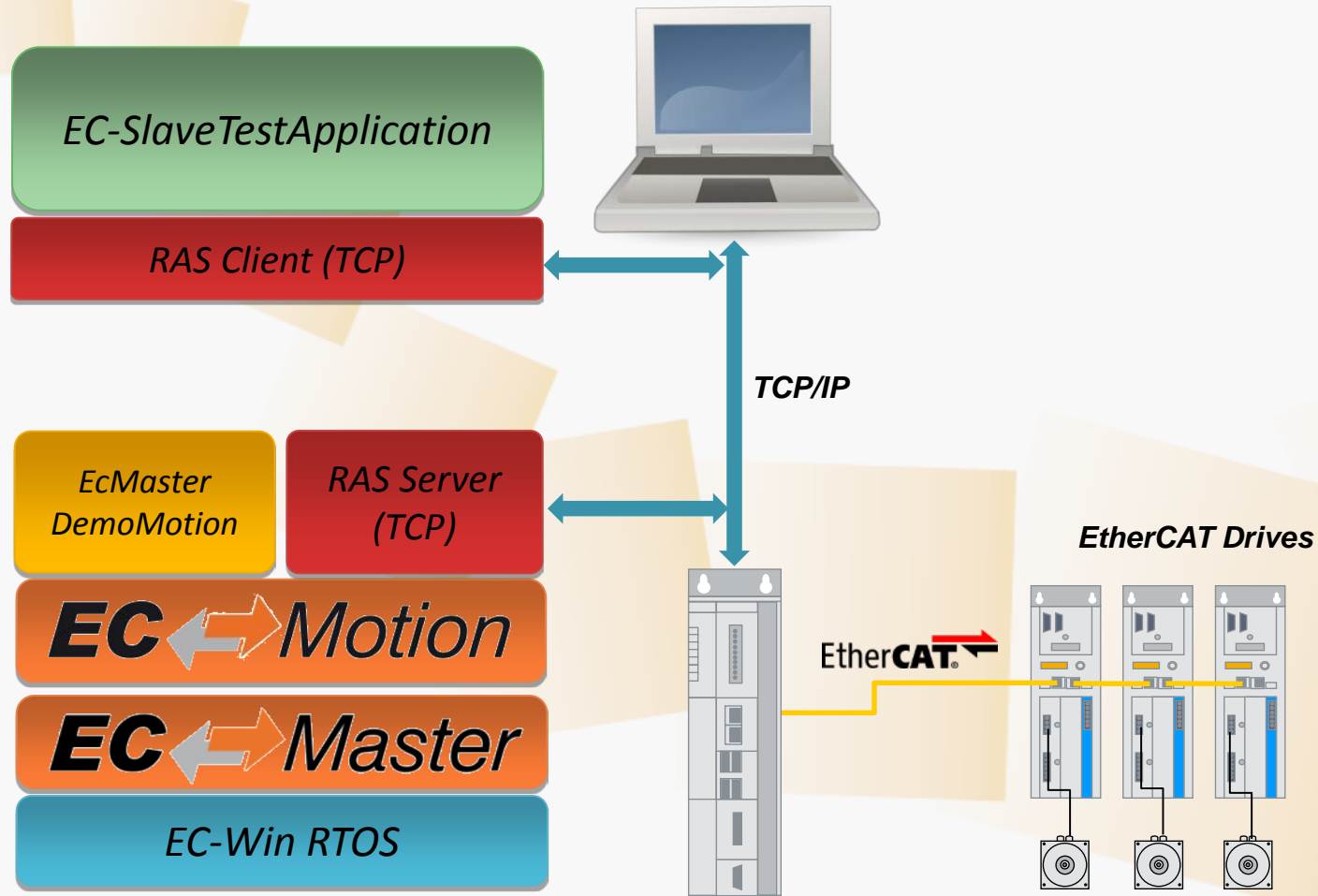
EC ***Motion***

Quick Start Guide for EC-Win

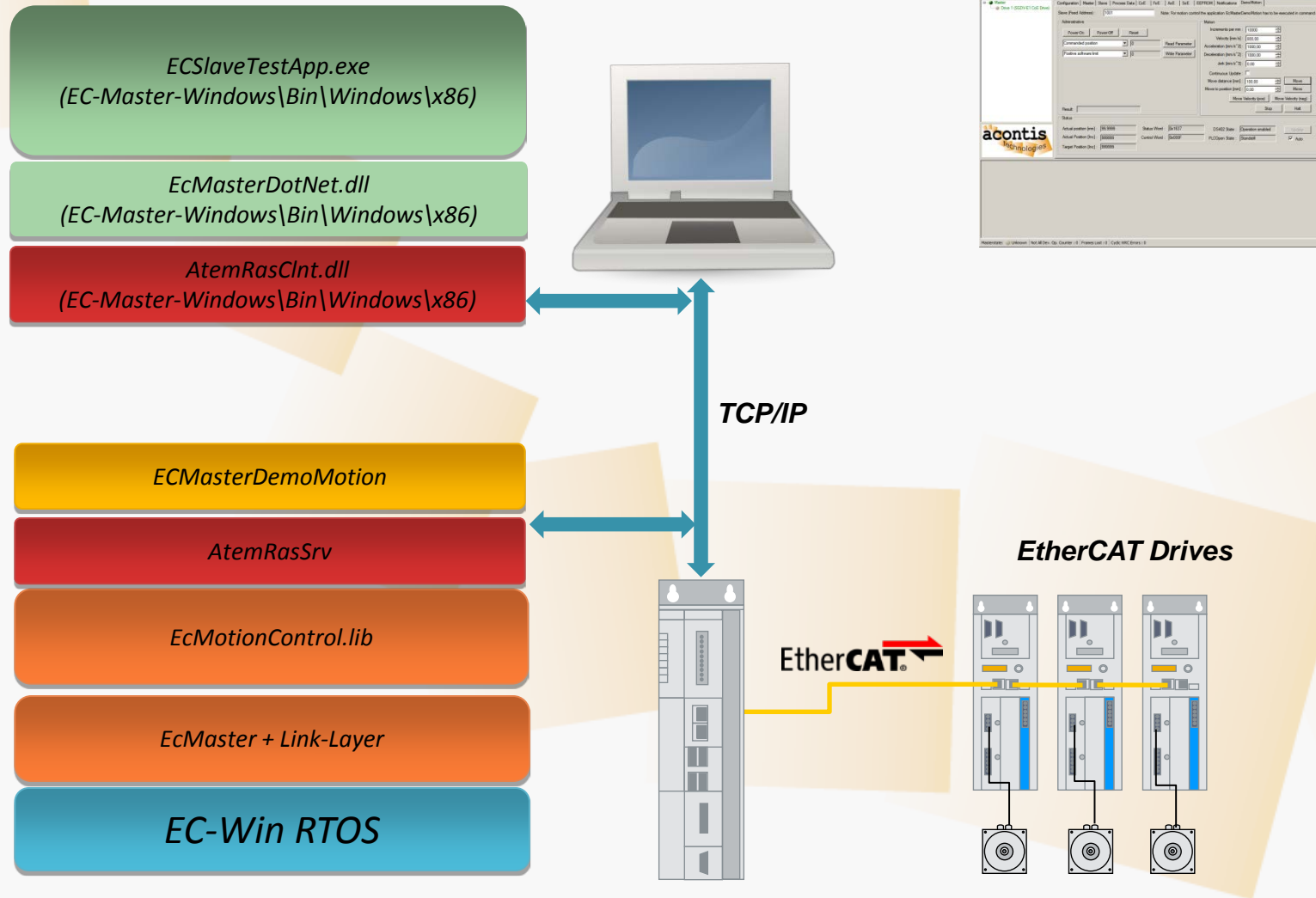
05 December 2013

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Software Modules



Required

1. *EC-Win EtherCAT Windows Real-time platform*
2. *EC-Win System Manager Tool*
3. *WinPcap Windows Paket Capture Library*
4. *EC-Engineer EtherCAT Configuration and Diagnosis Tool*

Recommended

1. *Microsoft XML Notepad* <http://www.microsoft.com/en-us/download/details.aspx?displaylang=en&id=7973>
2. *WireShark Network Protocol Analyzer* <http://www.wireshark.org/>

1.) Installation EC-Win EtherCAT Windows Real-time platform

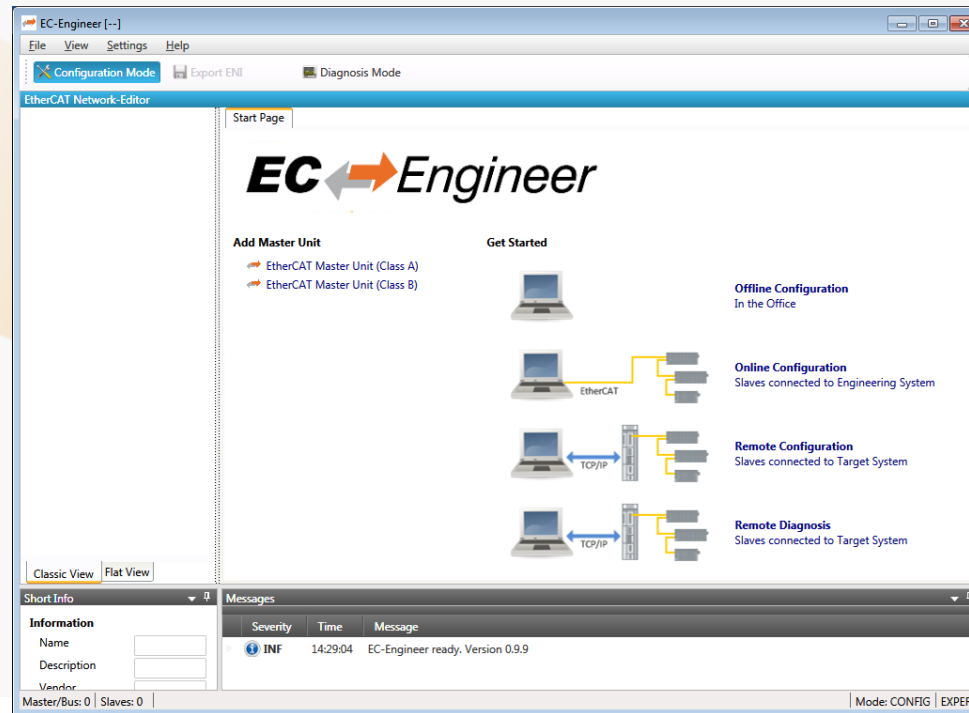
- *Execute setup.exe and follow the instructions*
- *Use default directories.*

2.) Installation EC-Win System Manager Tool

- *Extract the SystemManager_EC-Win.zip folder, and copy the “bin” folder to the installation path of your EC-Win EtherCAT Windows Real-time platform. (accept to overwrite the existing folder “bin”).*
- *Create a desktop shortcut:*
32Bit: `/bin/windows/x86/SystemManagerV2/SystemManager.exe`
64Bit: `/bin/windows/x64/SystemManagerV2/SystemManager.exe`

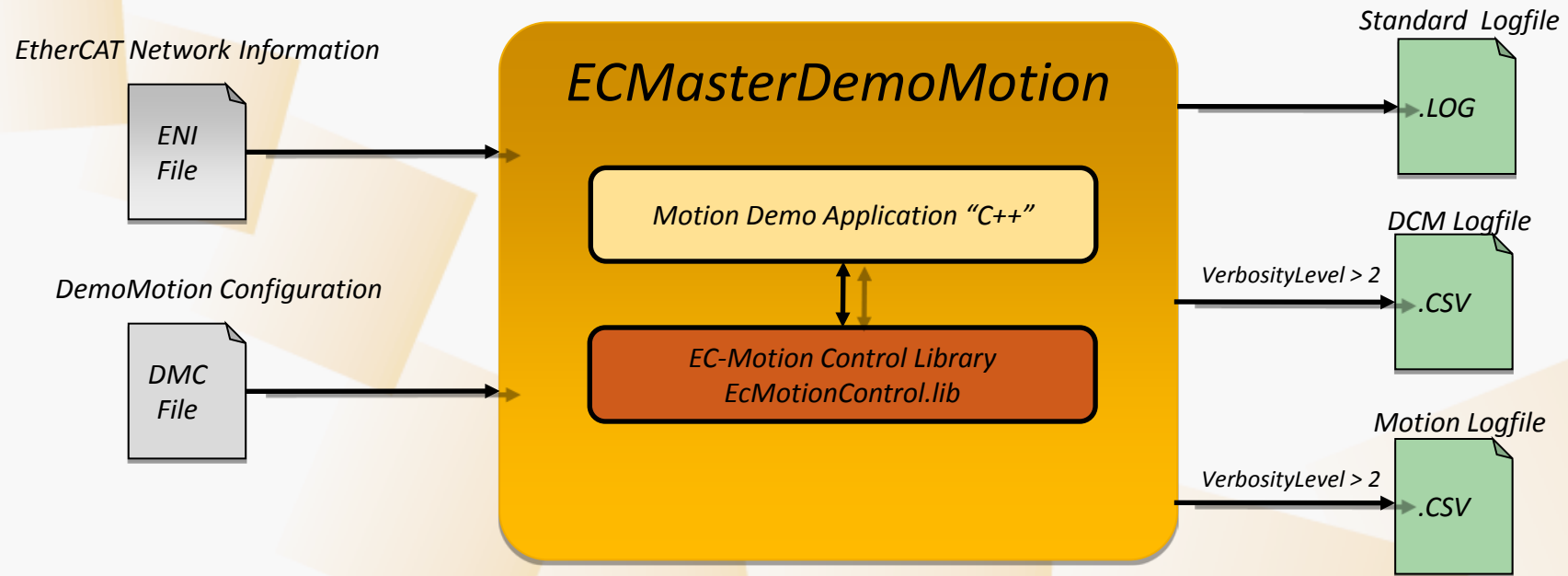
3.) Installation EC-Engineer

- WinPcap Windows Paket Capture Library <http://www.winpcap.org/>
- EC-Engineer
 - Unpack the file EC-Engineer_Eval_V1.x.x.zip
 - Execute setup.exe and follow the instructions



- *Example application shipped with complete C++ source code*
- *Distributed Clocks (DC) support*
- *By default support for 4 drives*
- *Supported drive operation modes: CSP, CSV and IP*
- *Two demo modes selected by variable S_bCmdMode*
 - *Independent mode: Drive moves forward and backward*
 - *Command mode: Communication to ECSlaveTestApp using ecatNotifyApp()*

ECMasterDemoMotion Input and Output Files



- The ENI file is located in "EC-Master-NNN\Examples\EcMasterDemoMotion\Config"
- The DMC file, e. g. MotionConfig.xml, is located in "EC-Master-NNN\Examples\EcMasterDemoMotion\Config" and contains all input parameters
- The Standard Logfile contains all messages and errors
- The DCM Logfile shows the quality of the DCM bus shift controller
- The Motion Logfile traces the actual and target position and other values
- All Logfiles are created in the folder of the executable

Create ENI file with EC-Engineer

Step 1: Connect EtherCAT Slaves

- In conjunction with EC-Win the EC-Engineer will scan the connected EtherCAT slaves
- For that purpose a second, dedicated network interface adapter for EtherCAT is required
- Prior to scanning the bus, the Ethernet network interface adapter will have to be assigned to the real-time environment (see details below in this document).
- Most of currently available Intel and Realtek network adapters are supported by EC-Win. Other Ethernet adapters beside Intel and Realtek cannot be used.

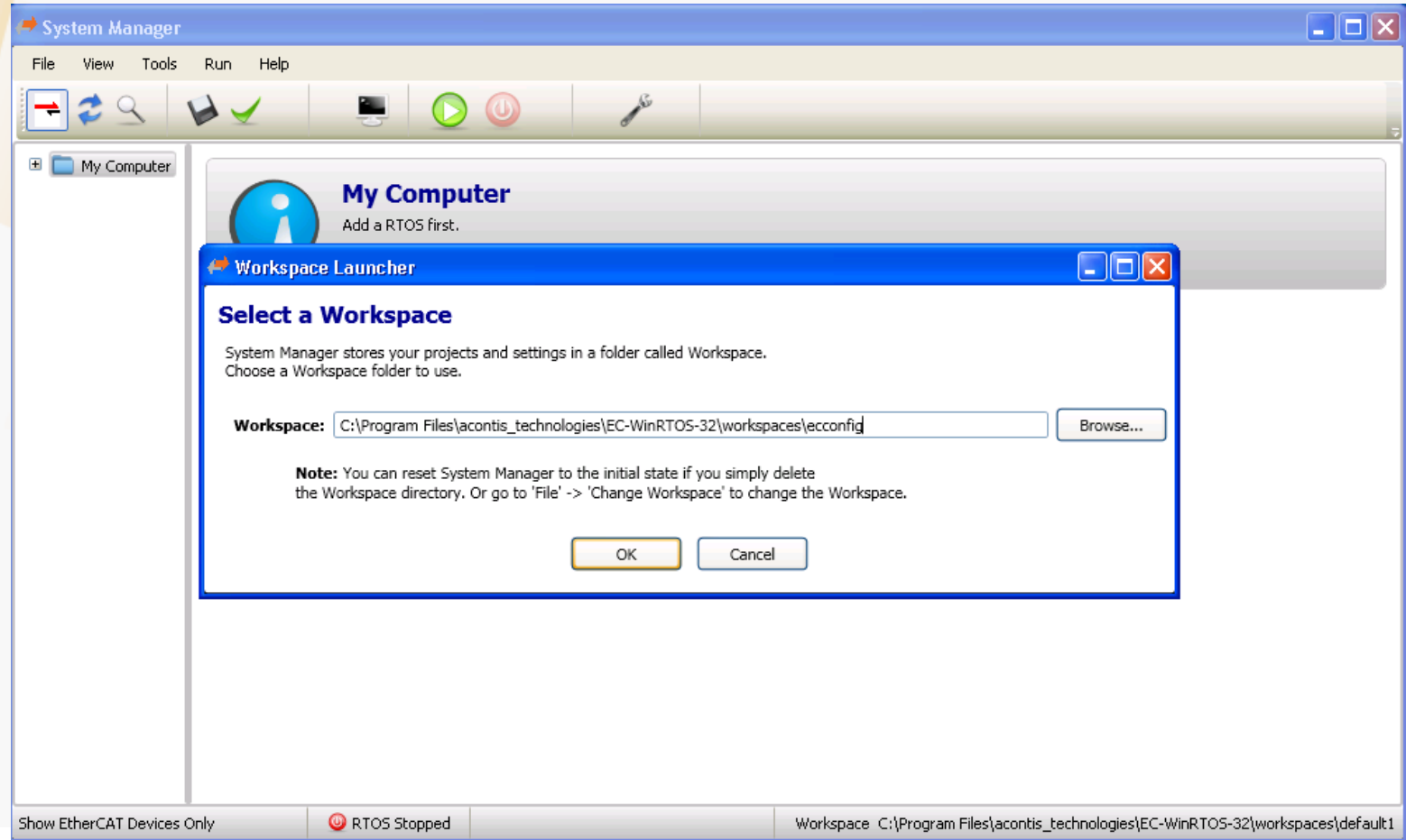


Create ENI file with EC-Engineer

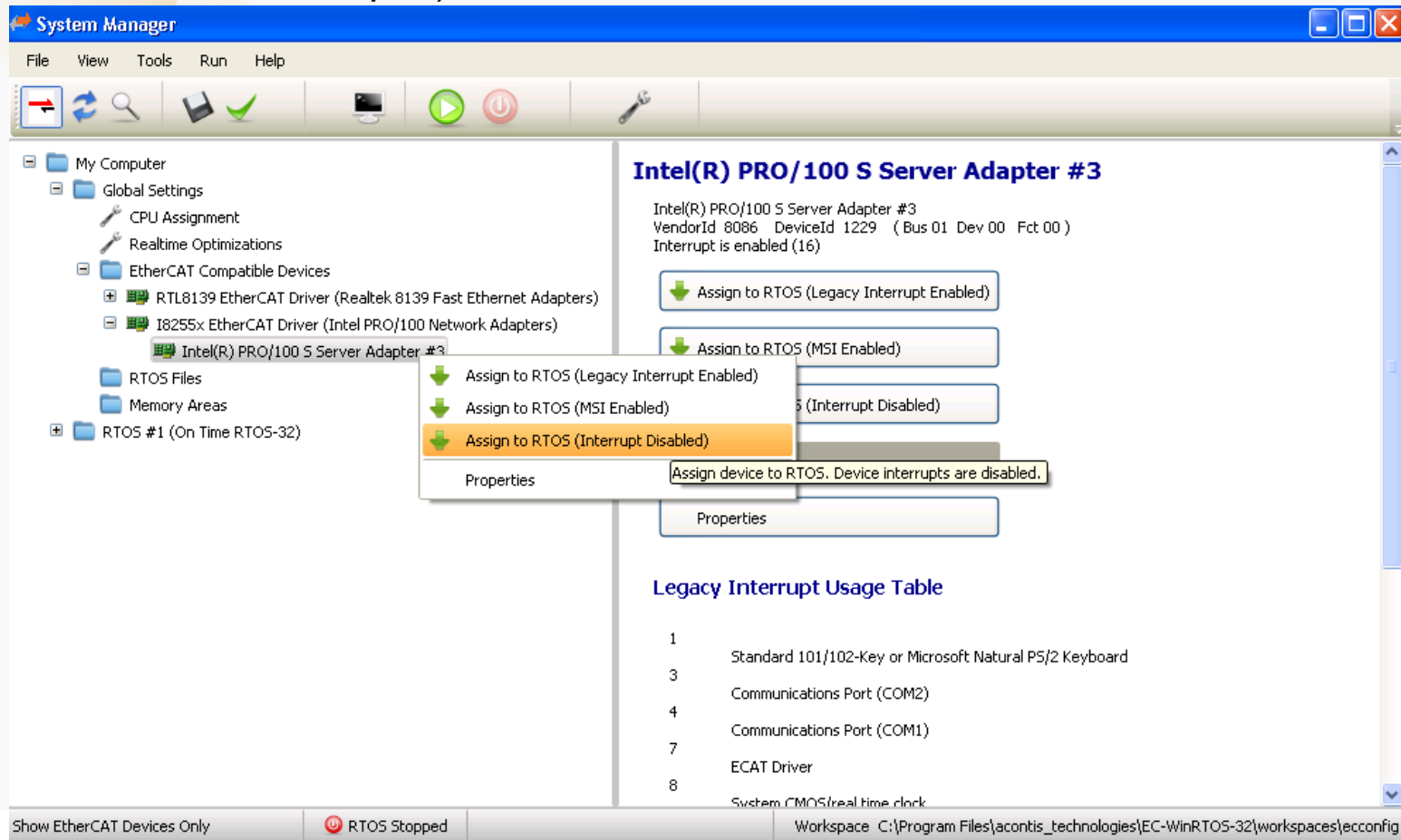
Step 2: Start MasterDemoMotion using the SystemManager



- After Starting the SystemManager create a new Workspace “ecmotion” in the default directory.



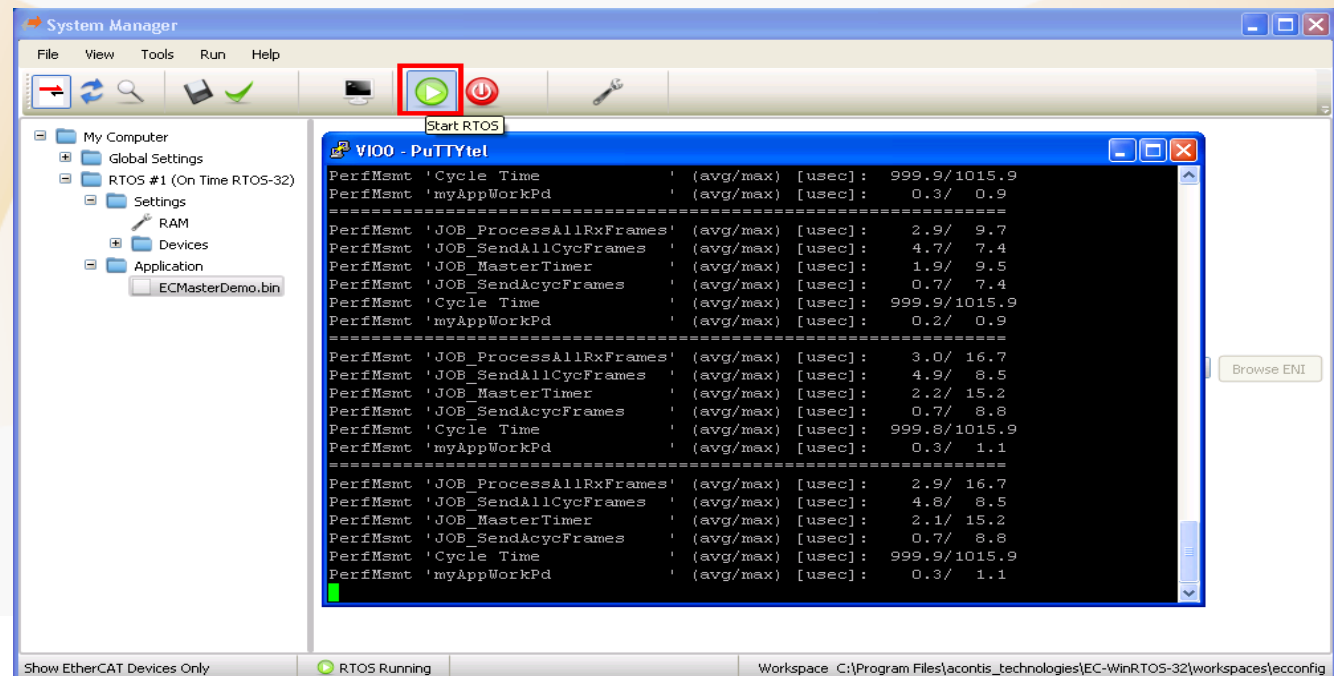
- After Adding an RTOS, you have to assign your Network Card (In this example an Intel Pro/100 Network Adapter) to the RTOS.



Create ENI file with EC-Engineer

Step 2: Start MasterDemo using the SystemManager

- Add the *ECMasterDemoMotion* application
- Now you can start the existing application *ECMasterDemoMotion.bin* which will automatically select the Network Adapter you assigned to the RTOS.
- Select a cycle time of 1000us.
- Now you have to select the Motion-Cfg-File, which will you find under */bin/windows/config/MotionConfig.xml*
- After opening a Target Console Window, start RTOS.

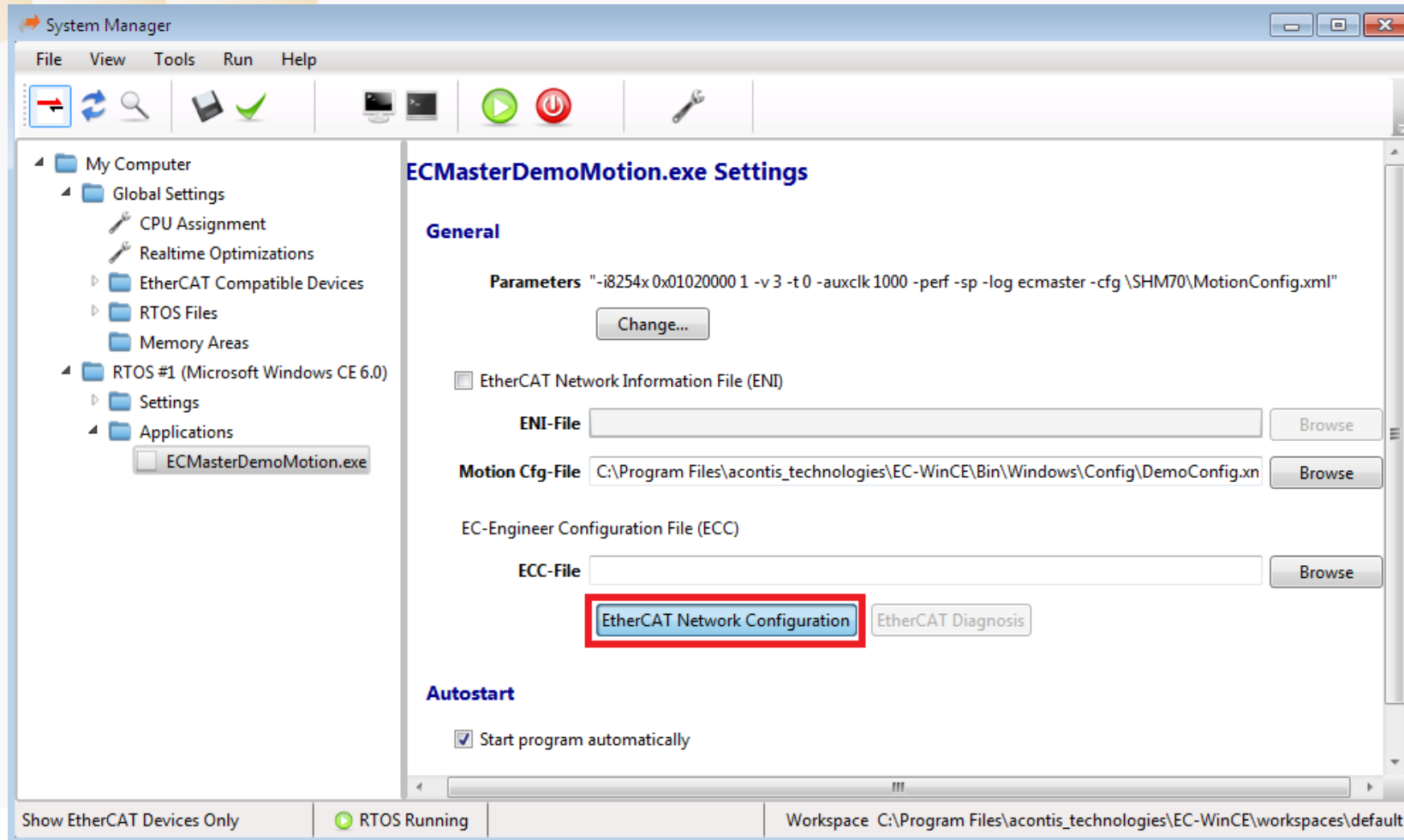


Create ENI file with EC-Engineer

Step 2: Start MasterDemo using the SystemManager



- Go back to the System Manager and click on „EtherCAT Network Configuration“



Create ENI file with EC-Engineer

Step 3: The found slave devices are listed in the tree



EC-Engineer will start and scan the devices.

The screenshot shows the EC-Engineer software interface. The top menu bar includes File, View, Network, Settings, and Help. Below the menu bar, there are buttons for Configuration Mode, Export ENI, and Diagnosis Mode. The main window is divided into several sections:

- Project Explorer:** Shows a tree structure with 'Class-A Master' and 'Slave_1001 [R88D-KN02H-ECT] (1001)'.
- Device Editor:** Contains tabs for General, PDO Mapping, and Variables. The PDO Mapping tab is active, showing two sections: 'Select The Inputs' and 'Select The Outputs'.
- Short Info:** Displays information about the selected device, including Name, Description, and Vendor.
- Messages:** A section for displaying messages, currently empty.

The 'Select The Inputs' section shows a table of input parameters:

Name	Index	Bit Length
Statusword	0x6041:00	16
Position actual val	0x6064:00	32
Touch probe statu	0x60B9:00	16
Touch probe pos1	0x60BA:00	32
Touch probe pos2	0x60BC:00	32
Error code	0x603F:00	16
Digital inputs	0x60FD:00	32
258th transmit PDO Mapping (excluded by 0x1B: 0x1A00)		
258th transmit PDO Mapping (excluded by 0x1B: 0x1A00)		
Name	Index	Bit Length
Error code	0x603F:00	16
Statusword	0x6041:00	16
Position actual val	0x6064:00	32

The 'Select The Outputs' section shows a table of output parameters:

Name	Index	Bit Length
Controlword	0x6040:00	16
Target position	0x607A:00	32
Touch probe funct	0x60B8:00	16
258th receive PDO Mapping (excluded by 0x170: 0x1600)		
258th receive PDO Mapping (excluded by 0x170: 0x1600)		
Name	Index	Bit Length
Controlword	0x6040:00	16
Target position	0x607A:00	32
Touch probe funct	0x60B8:00	16
Physical outputs	0x60FE:01	32
259th receive PDO Mapping (excluded by 0x1: 0x1702)		
259th receive PDO Mapping (excluded by 0x1: 0x1702)		
Name	Index	Bit Length
Controlword	0x6040:00	16

The bottom status bar shows 'Networks: 1 | Slaves: 1' and 'Status: Mode: CONFIG | STANDARD'.

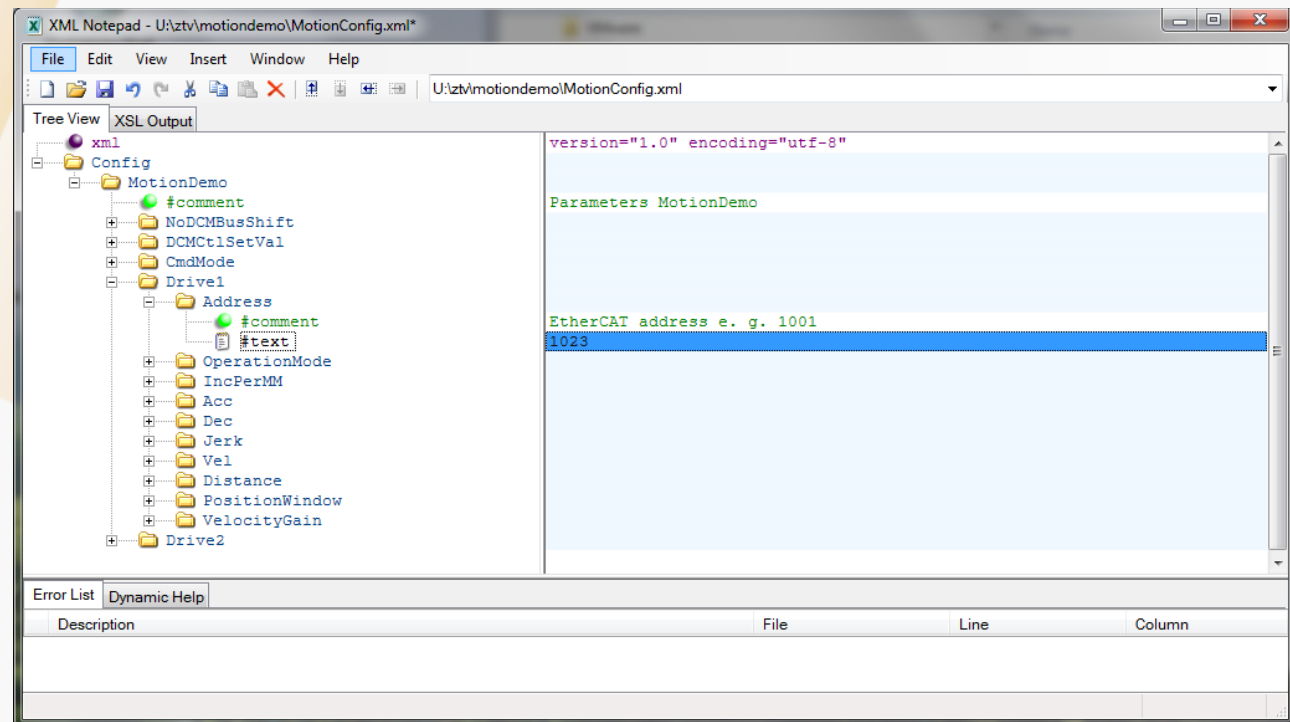
Create ENI file with EC-Engineer
 Step 4: Adjust PDO Mapping and Modes of Operation

<i>0x6060=7 Interpolated Position Mode (IP)</i>		<i>0x6060=8 Cyclic Synchronous Position Mode (CSP)</i>		<i>0x6060=9 Cyclic Synchronous Velocity Mode (CSV)</i>	
Inputs	Outputs	Inputs	Outputs	Inputs	Outputs
<i>0x6041 Statusword</i>	<i>0x6040 Controlword</i>	<i>0x6041 Statusword</i>	<i>0x6040 Controlword</i>	<i>0x6041 Statusword</i>	<i>0x6040 Controlword</i>
<i>0x6064 Position Actual Value</i>	<i>0x6062 Position Demand Value or 0x60C1 Interpolation data record</i>	<i>0x6064 Position Actual Value</i>	<i>0x607A Target Position</i>	<i>0x6064 Position Actual Value</i>	<i>0x60FF Target Velocity</i>

Adjust DemoMotion Configuration File

Adjust EtherCAT address of specific drive.

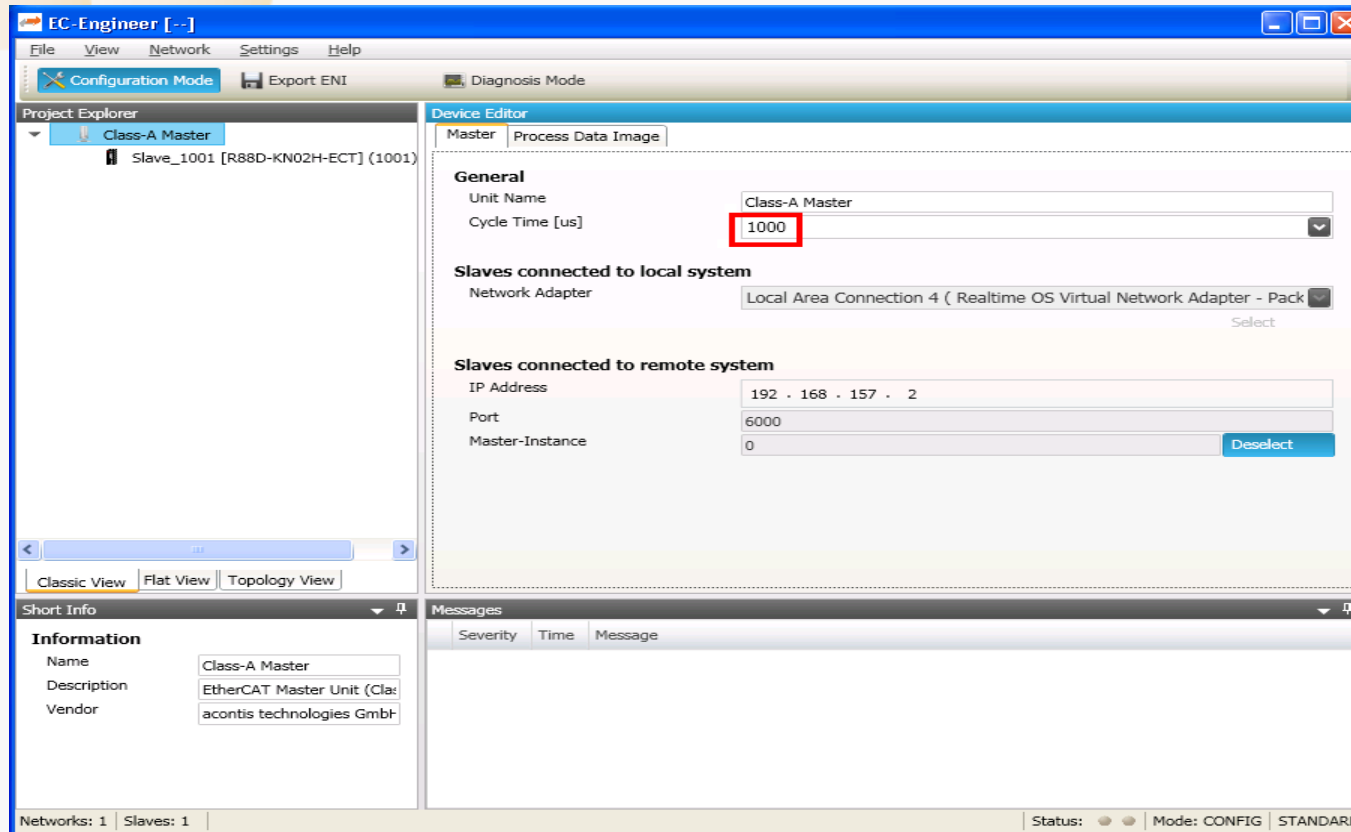
- Select the Drive1 entry in node “MotionDemo”
- Select the Address entry sub-node
- Set the value to the desired EtherCAT address. In this example 1023.



Create ENI file with EC-Engineer

Step 5: Start MasterDemo using the SystemManager

After checking the Cycle Time (1000us) close the Engineer and click on Yes.

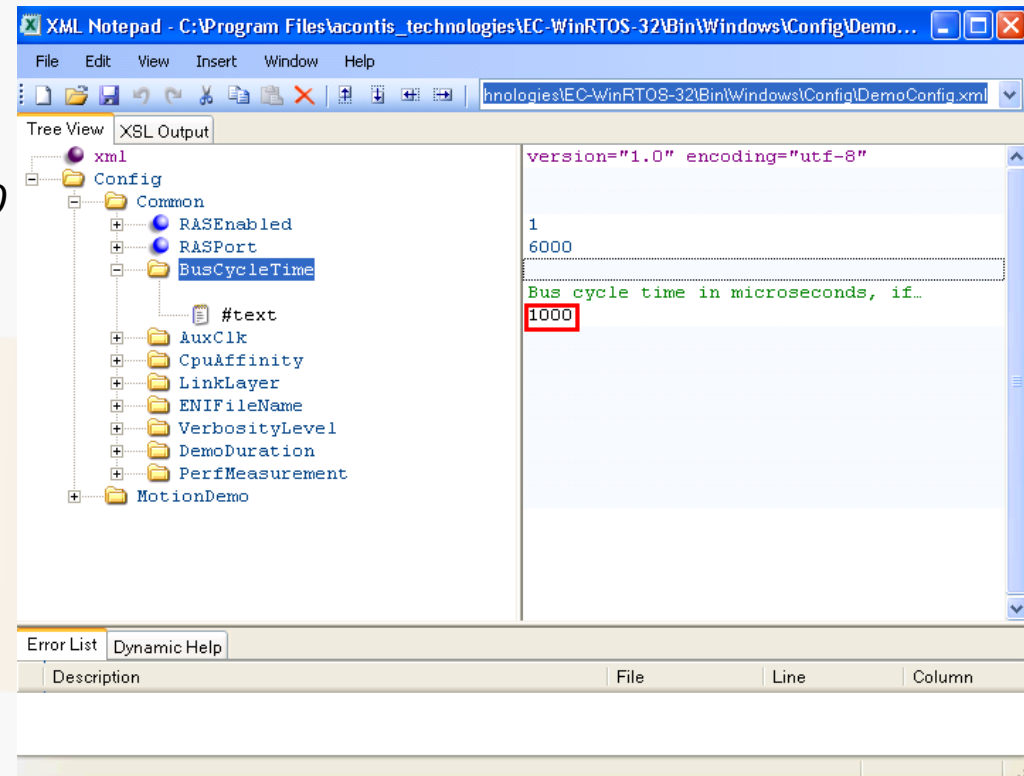


Go back to the System Manager and you will see the generated File is automatically selected as Eni-File.

Adjust DemoMotion Configuration File

Step 1: Introduction / Set the “BusCycleTime”

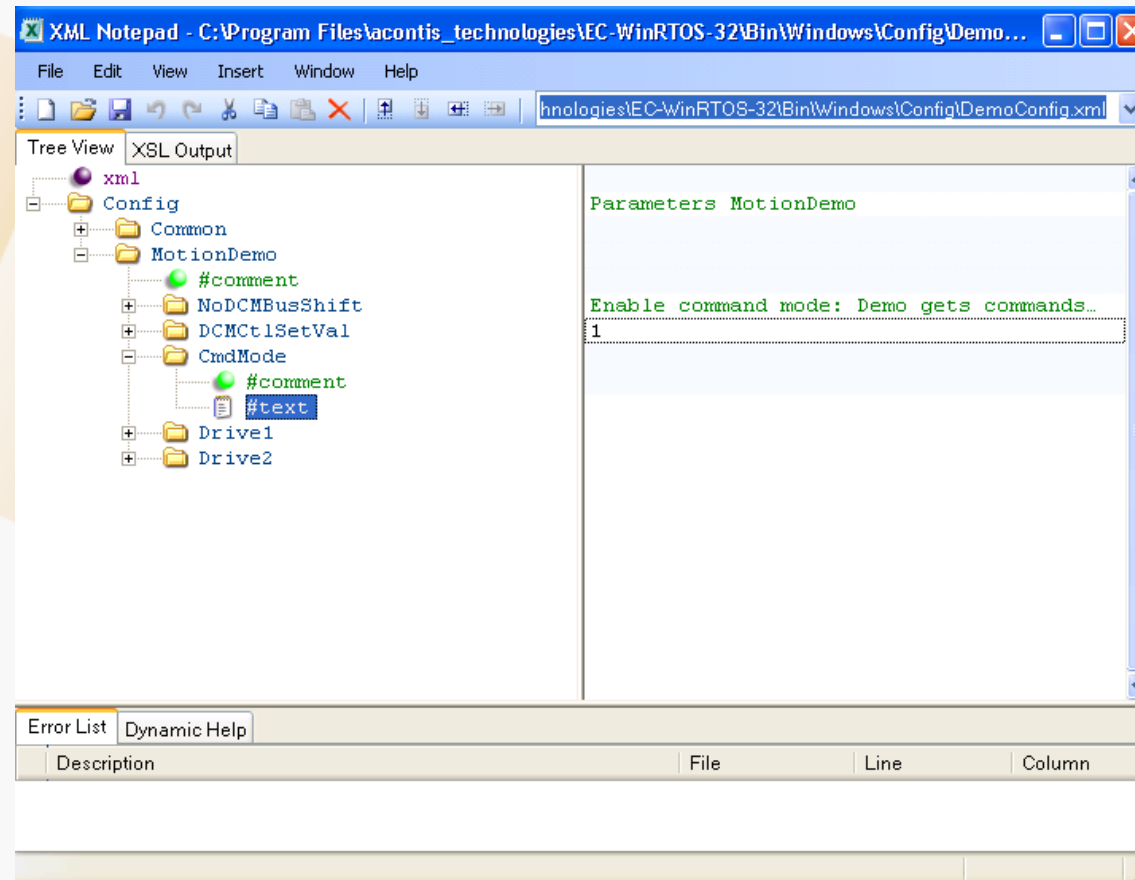
- The DMC file, e. g. MotionConfig.xml is located in the folder “... \bin\Windows\Config”
- Use Notepad or XML Notepad for editing
- In the “Common” section all general parameters are defined, e. g. “BusCycleTime”
- The BusCycleTime has to be set to 1000
- In the “MotionDemo” section all specific parameters for this application are defined
- All drive relevant parameters are defined in “Drive1” etc.
- ECMasterDemoMotion supports by default 4 drives



Adjust DemoMotion Configuration File

Step 2: Set Command Mode to “1”.

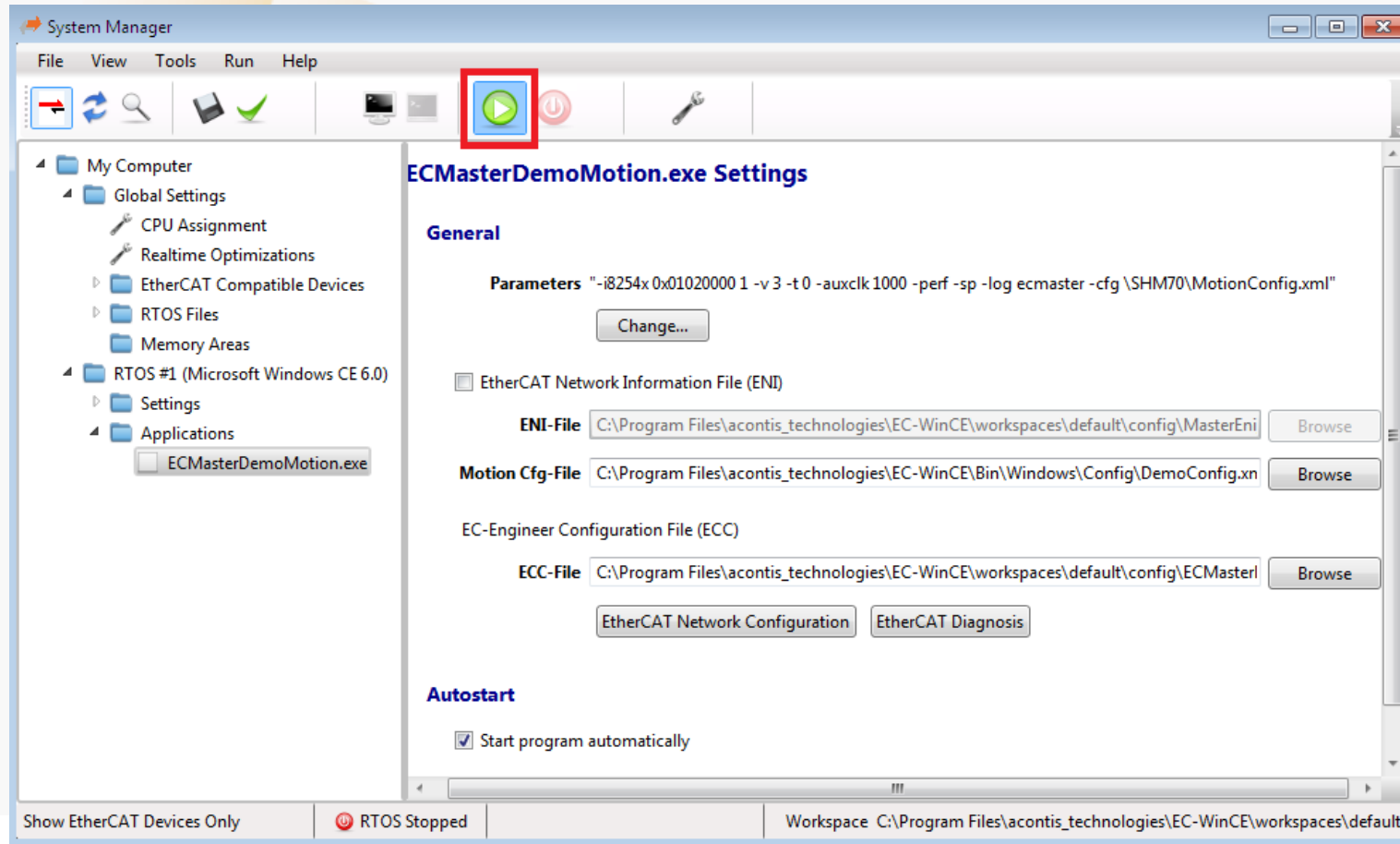
- Select the CmdMode entry in node “MotionDemo”
- Set the value to “1”, to enable command mode.



Start ECMasterDemoMotion

For Starting the ECMasterDemoMotion use the SystemManager

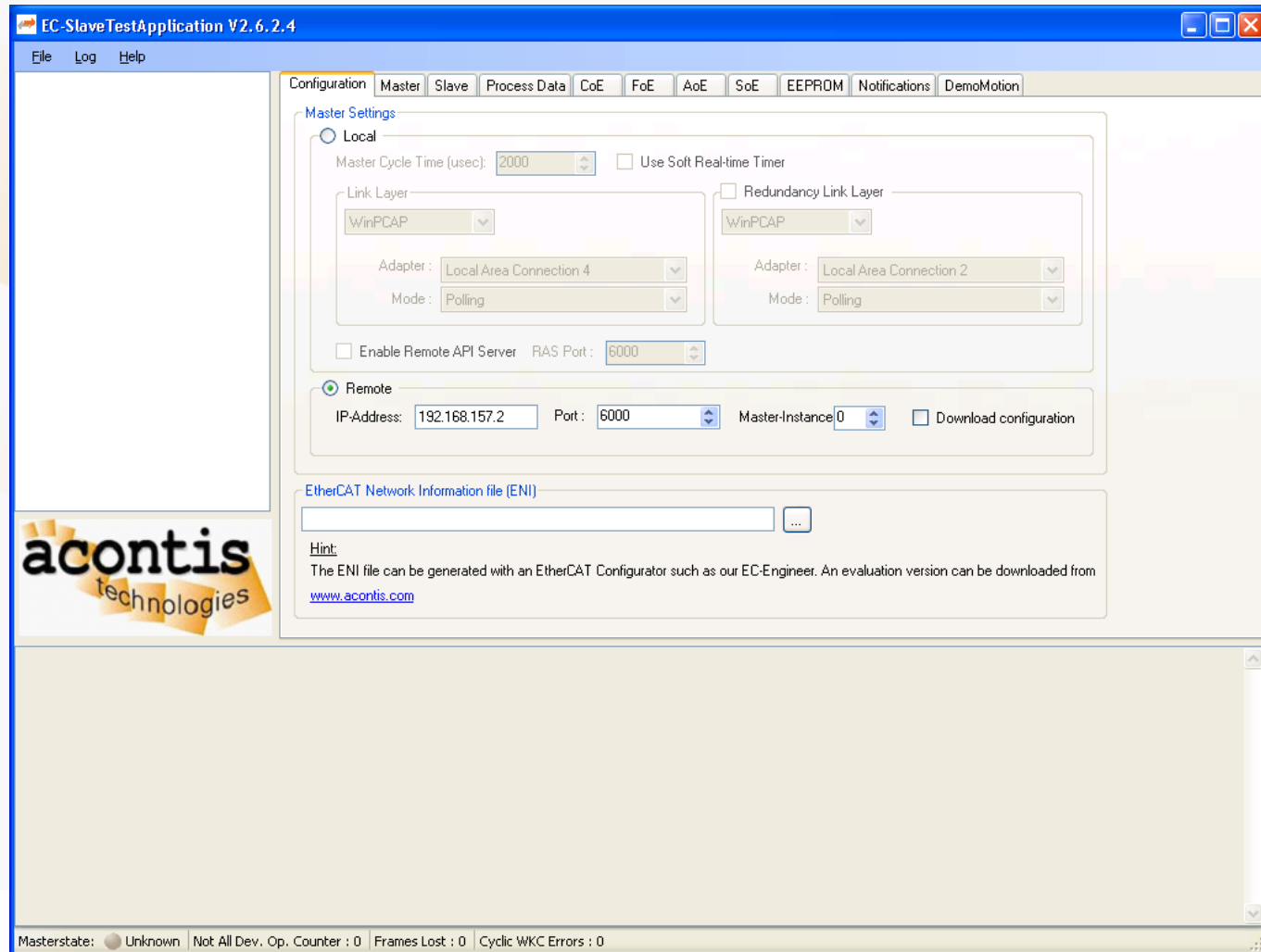
- *After opening a Target Console Windows, Start RTOS.*



Start ECSlaveTestApp.EXE and set IP address



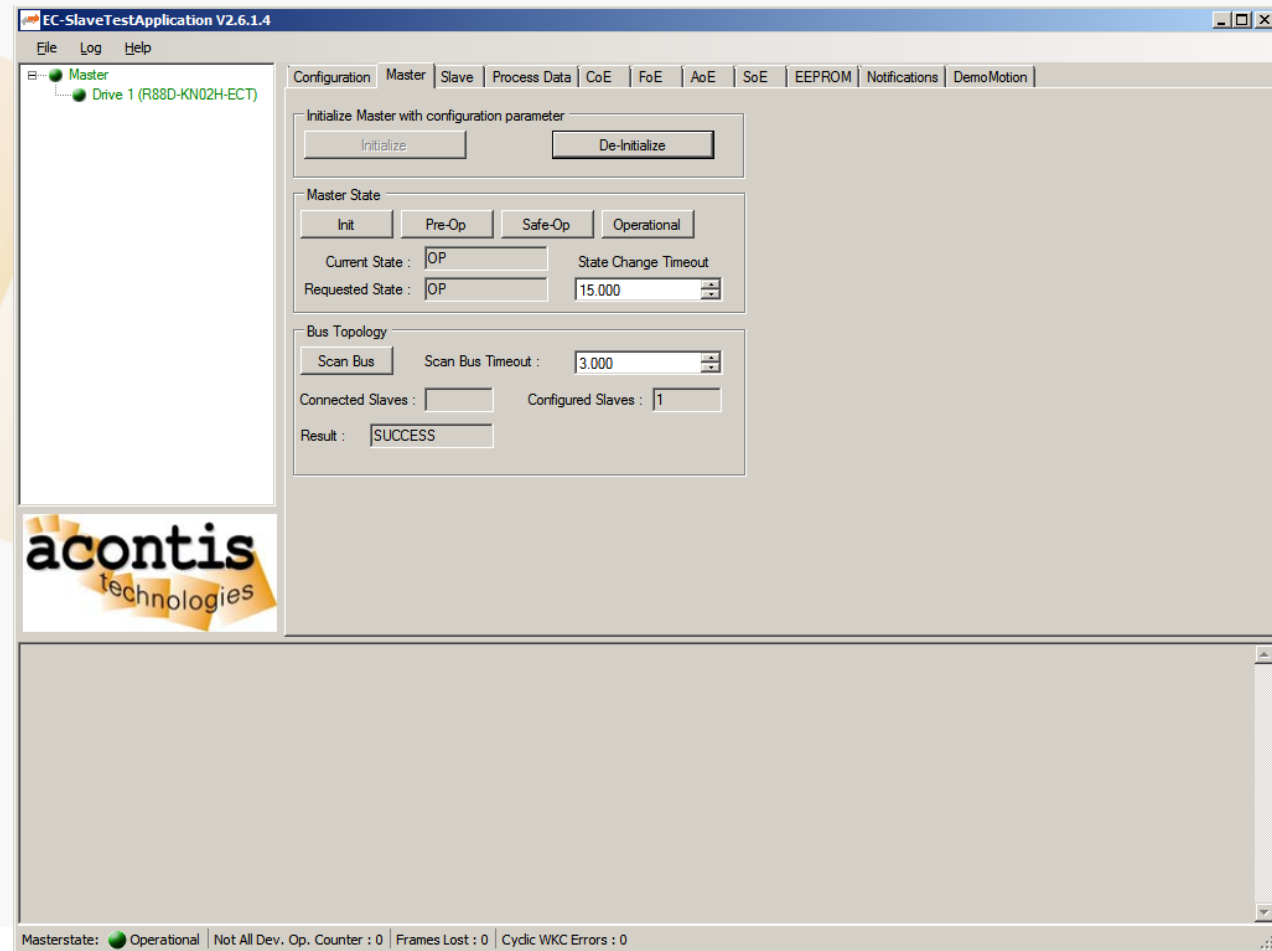
- Select “Remote” and set the IP-Address of the Realtime OS into IP-Address



Establish connection to ECMasterDemoMotion

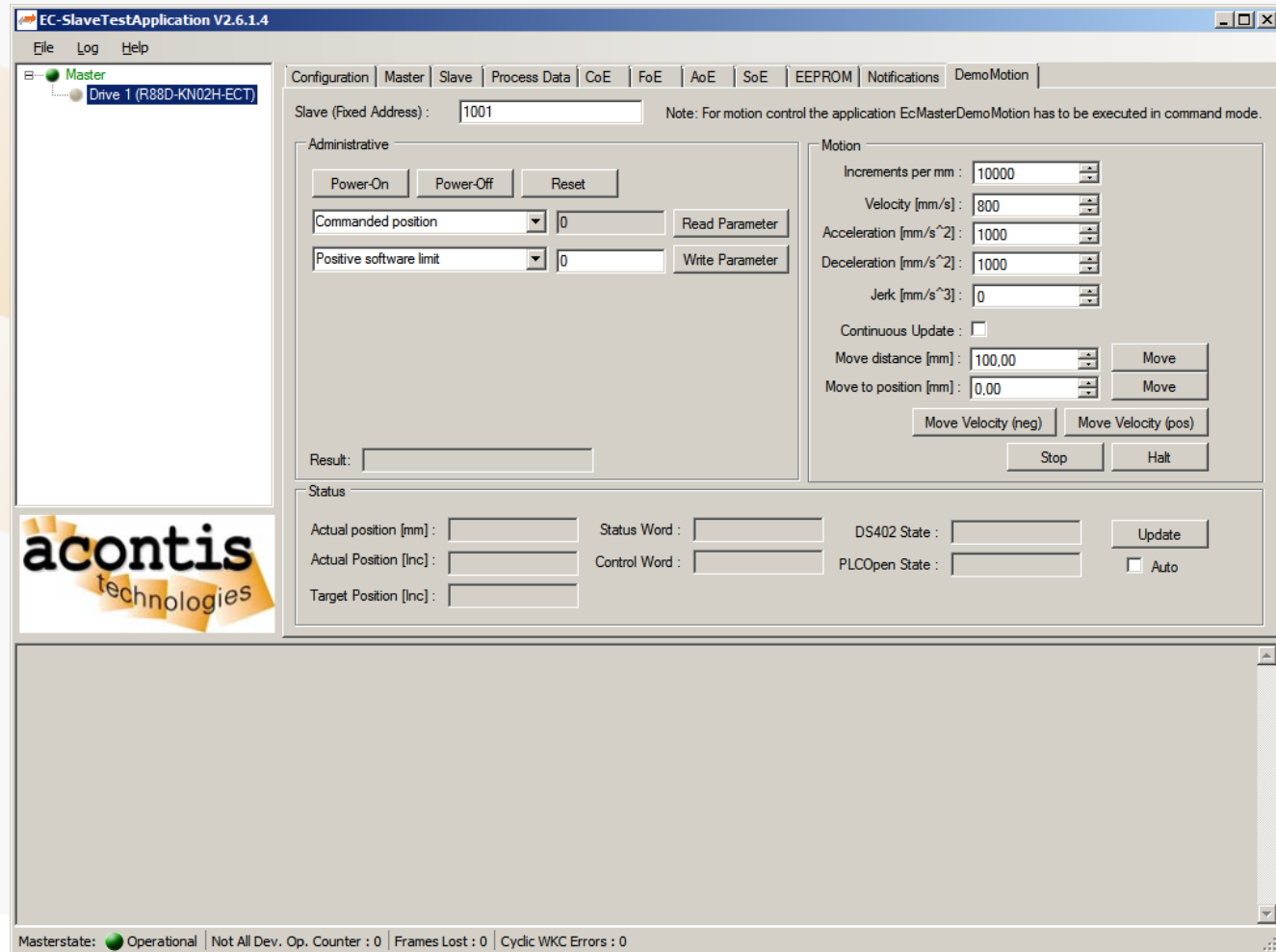


- On tab “Master” select the button “Initialize”



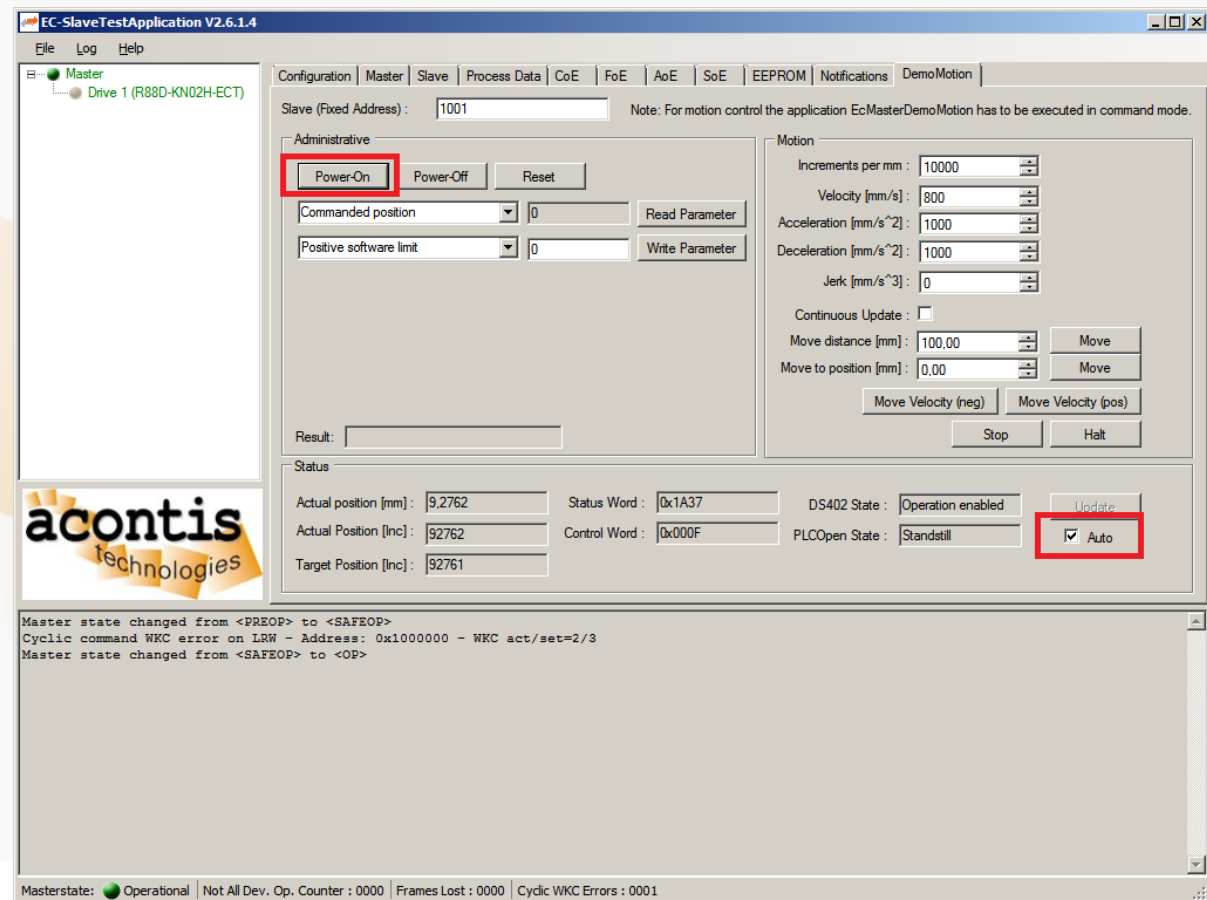
Select the first drive

- Select on tab “DemoMotion” the first drive in the tree



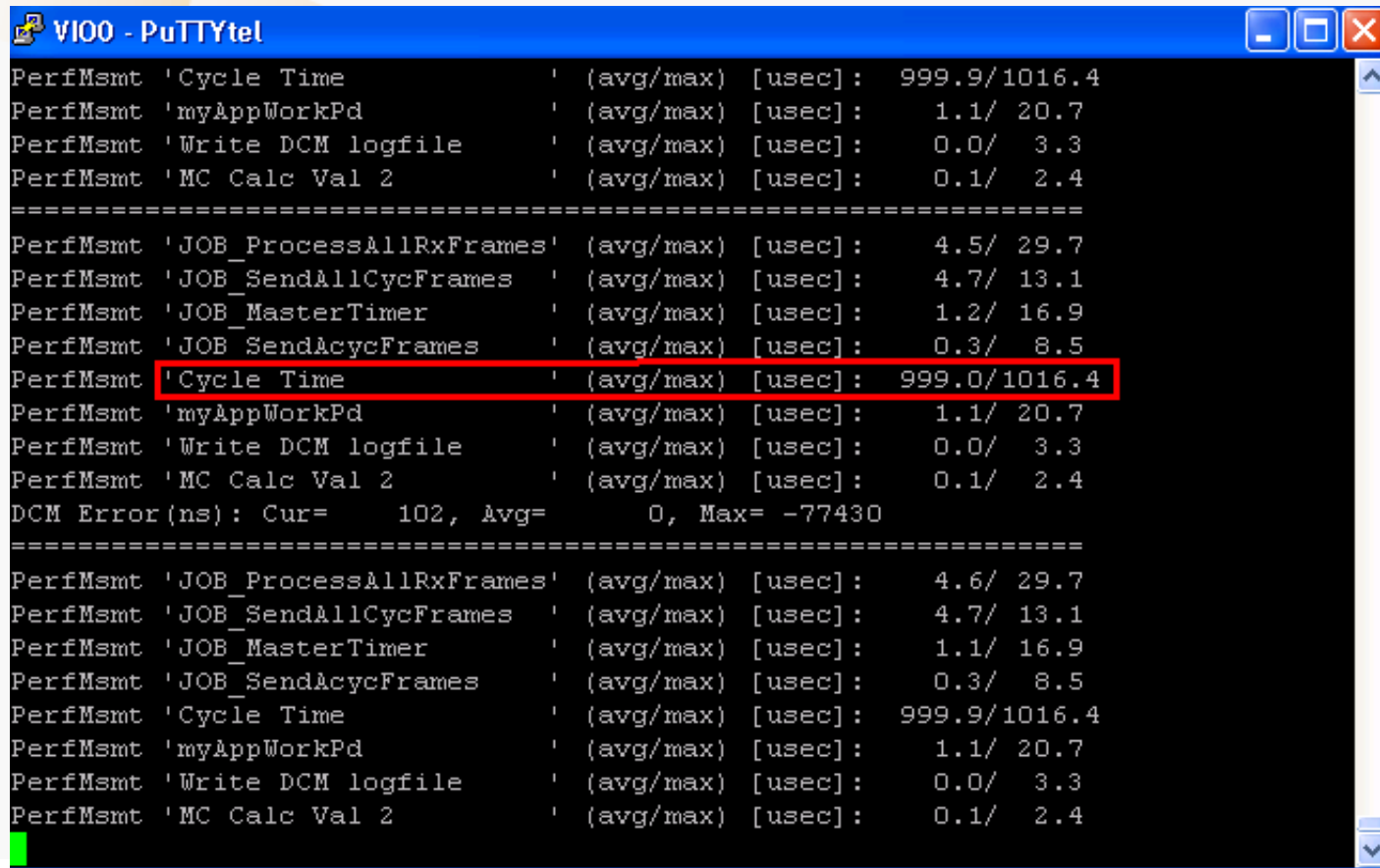
Power-On drive and move it

- Select the checkbox “Auto” and the values in the status area should be updated. If possible manually turn at the motor
- Select button “Power-On”



- *Check the cycle time. A stable cycle time is required.*

PerfMsmt 'Cycle Time ' (avg/max) [usec]: 999.0/1016.4 → o.k.



```
VIO0 - PuTTYtel
PerfMsmt 'Cycle Time ' (avg/max) [usec]: 999.9/1016.4
PerfMsmt 'myAppWorkPd ' (avg/max) [usec]: 1.1/ 20.7
PerfMsmt 'Write DCM logfile ' (avg/max) [usec]: 0.0/ 3.3
PerfMsmt 'MC Calc Val 2 ' (avg/max) [usec]: 0.1/ 2.4
=====
PerfMsmt 'JOB_ProcessAllRxFrames' (avg/max) [usec]: 4.5/ 29.7
PerfMsmt 'JOB_SendAllCycFrames ' (avg/max) [usec]: 4.7/ 13.1
PerfMsmt 'JOB_MasterTimer ' (avg/max) [usec]: 1.2/ 16.9
PerfMsmt 'JOB_SendAcycFrames ' (avg/max) [usec]: 0.3/ 8.5
PerfMsmt 'Cycle Time ' (avg/max) [usec]: 999.0/1016.4
PerfMsmt 'myAppWorkPd ' (avg/max) [usec]: 1.1/ 20.7
PerfMsmt 'Write DCM logfile ' (avg/max) [usec]: 0.0/ 3.3
PerfMsmt 'MC Calc Val 2 ' (avg/max) [usec]: 0.1/ 2.4
DCM Error(ns): Cur= 102, Avg= 0, Max= -77430
=====
PerfMsmt 'JOB_ProcessAllRxFrames' (avg/max) [usec]: 4.6/ 29.7
PerfMsmt 'JOB_SendAllCycFrames ' (avg/max) [usec]: 4.7/ 13.1
PerfMsmt 'JOB_MasterTimer ' (avg/max) [usec]: 1.1/ 16.9
PerfMsmt 'JOB_SendAcycFrames ' (avg/max) [usec]: 0.3/ 8.5
PerfMsmt 'Cycle Time ' (avg/max) [usec]: 999.9/1016.4
PerfMsmt 'myAppWorkPd ' (avg/max) [usec]: 1.1/ 20.7
PerfMsmt 'Write DCM logfile ' (avg/max) [usec]: 0.0/ 3.3
PerfMsmt 'MC Calc Val 2 ' (avg/max) [usec]: 0.1/ 2.4
```

- *Check PDO mapping in case of error messages like:*
ERROR: Invalid PDO mapping: Target Position Object=0x607A not found
- *Contact acontis technical support ecsupport@acontis.com*
 - *Required information: Drive manufacturer and model*
 - *Required files: ESI (EtherCAT Slave Information), ENI (EtherCAT Network Information), ECC (EC-Engineer project file), all logfiles*

Next Steps

- *Learn more about EcMasterDemo and the application framework
→ EC-Master Class B User Manual Chapter 3.3 “Application Framework”*
- *Take at closer look into the source code of EcMasterDemoMotion
Compile and debug the source code with Visual Studio*
- *Take at closer look at the EcMotionLibrary*