Taiwan Pulse Motion
Inspire New Automation

ECPWG®

Robust and High-performance

EtherCAT SoftMotion Control Solutions

Complete Smart Manufacturing Solutions

https://www.tpm-pac.com/

Smart manufacturing solutions

Production

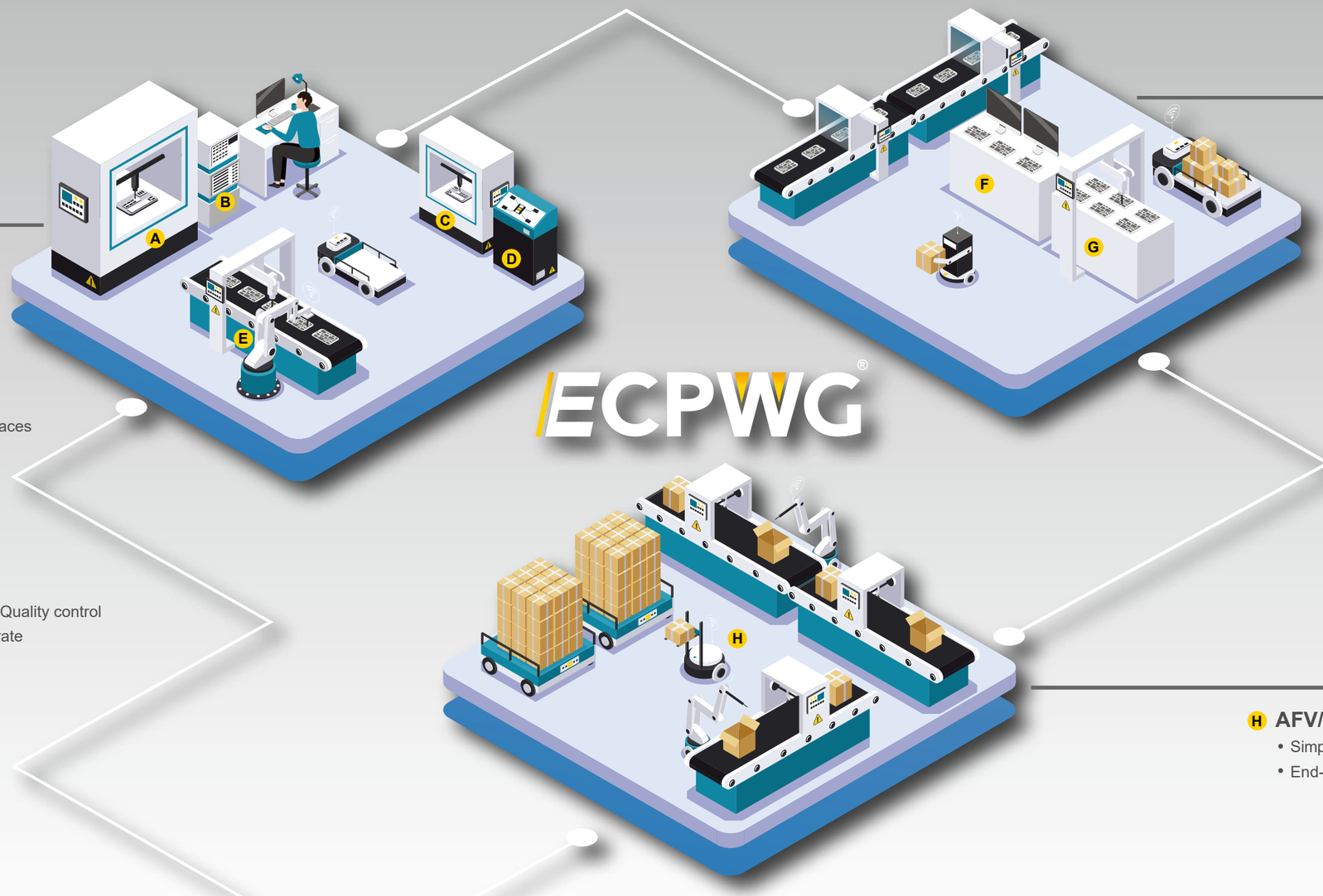
A Motion Control
- Centralized and distributed motion control to match performance and precision positioning

B Machine Vision
- Full spectrum of frame grabbers supporting digital and analog interfaces

C IO Sensing
- Comprehensive slave modules for the bridge connected to EtherCAT

D AI AOI
- Improves inspection accuracy and Quality control
- Reduce manpower cost and error rate

E Data Extraction
- Production information monitoring
- Availability/uptime management



Testing

F Data Acquisition
- Device control
- Device management

G QA/QC testing
- QA/QC testing
- Validation

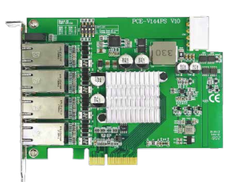
Logistic

H AFV/AMR
- Simple development & Flexible deployment
- End-to-end communicability

Product Solution

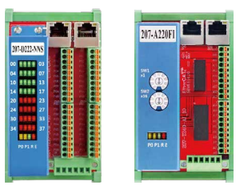
Motion Control

Machine Vision

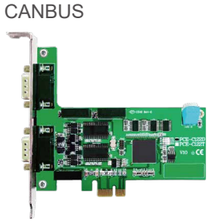


Nu-Servo

IO



CANBUS



About Taiwan Pulse Motion

Taiwan Pulse Motion (TPM), founded in 2009, is a forward-looking automation solution provider mainly focuses on EtherCAT® and Motionnet® based motion control products. The product range covers PACs,SoftMotion Controller, Motion Cards, Digital I/O, Analog I/O and Closed-loop / Micro-step drives and Custom carrier boards.

We are passionate about helping your business to grow through our specialized services, not only provide a wide range of EtherCAT/Motionnet products but also offer time-to-market custom design solutions in a variety of applications and industries.

Our Vision

Inspire New Automation.

Always thinking ahead to inspire innovation out of necessity.

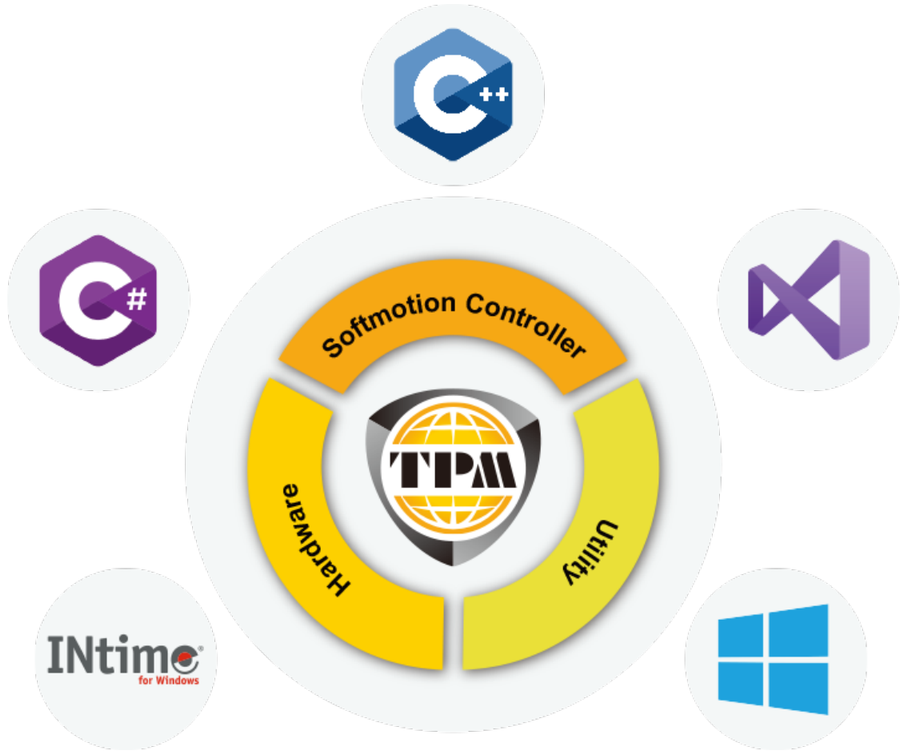
Our Mission

To be a turn-key solution provider.

Advance industries by delivering innovative product solutions.

The ECPWG PC-based EtherCAT SoftMotion Controller

ECPWG- A robust and affordable software based control system providing a variety of motion control library for Microsoft Windows and G/M code supported machines.



Softmotion Controller

ECPW

- Powered by INtime® RTOS.
- CoE (CANOpen over EtherCAT) Supported
- Distributed Clocks up to 0.5ms
- Control up to 60 axes
- Access up to 10,000 digital I/O points
- Off-line simulation mode supported

ECPWG

ECPW G/M Code Supported Version

- Powered by INtime® RTOS.
- CoE (CANOpen over EtherCAT) Supported
- Distributed Clocks up to 0.5ms
- Control up to 60 axes
- Access up 10,000 digital I/O points
- Off-line simulation mode supported
- Abundunt Motion Library
- Multi Motion Library Supported

Hardware

IPC

- Quad-Core CPU (Min.)
- Intel i210/i211 NIC
- Windows 7 or 10

Nu-Servo

2-Phase (Closed-Loop/Open-Loop)

- EtherCAT CiA402 device profile
- 500~50,000 PPR
- Current 2.8A~4.2A

5-phase (Micro-Stepping)

- EtherCAT CiA402 device profile
- Resolution 1 ~ 400,000 PPR
- Current 0.75A~ 2.8A

IO

- High-Density IO points up to 96CH
- Transmission Speed: 100Mbps
- Response Time: ON OFF 50μs
  OFF ON 10μs

Utility

ECATNavi

A GUI tool written in C# for simulating various functions of ECPW Library.

ECATScan

An user-friendly graphic interface for users to generate ENI file and configurate PDO mapping.

MyDrive

A NuServo stepper drive utility to configure and perform stepper tunning and evaluation.

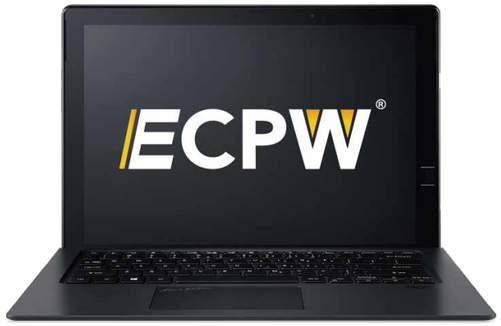
NCNavi

A GUI to edit and execute scripts and to plot the path of axis positioning.

MyRobotPro

A robot control software featured suite of utility tool to configure and monitor.

ECPW



Specifications

- EtherCAT master powered by INtime® RTOS.
- Support CoE (CANOpen over EtherCAT)
- EtherCAT Distributed Clocks up to 0.5ms
- Control up to 60 axes
- Access up to 10,000 digital I/O points.
- Simulation mode for offline test
- Visual Studio C/C++ and C# development
- Compliant Windows 7 32/64 and Window 10
- ECATNavi utility tool for diagnosis

A high-performance and affordable SoftMotion controller for smart factory machine makers.

High Efficiency

ECPW APIs allow developers to quickly create machine control applications in C++, C#, VS, and more

High Performance

Provide robust motion library to build high performance machinery with machine vision features

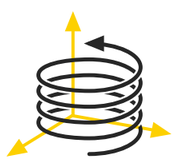
Cost-Effective

Control up to 60-axes variety of synchronized softmotion from saving hardware costs

User-friendly UI

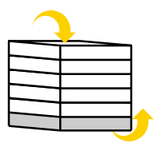
Easy-configuration utility tool to intergrade EtherCAT distributed module like drives and IOs

Features



Group

Combine multiple axes to form Line, Arc, and Helix

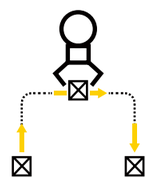


Buffer

Add commands into buffer to emit delay

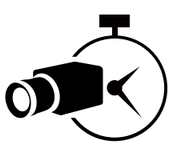
Feed change

Dynamic feed rate adjustments on the fly



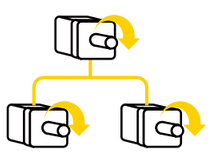
Smoothness

Achieve smoothness between paths by Fillet or Overlapping



IO Event

Support Latch and Comapre Trigger



Synchronization

Slave axis can follow Master axis by a ratio

Concurrent usage

Support multiple client applications simultaneously

Others

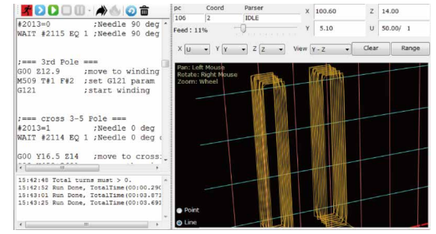
- Simulation mode
- Rotary Axis
- CSP Homing
- MPG (Manual Pulse Generator)

ECPWG

Specifications

- Full feature of ECPW controller
- Support standard G code
- Various execution modes
  - Run all/ Run step / Goto / Verify...
- Can assign up to 10 axes and 100 DIO bits
- Allow user-defined G code
- Extended syntax
- UI Tool to edit/execute/monitor

ECPWG is an EtherCAT SoftMotion control system technology with supported G/M codes that are highly scalable, allowing for easy integration into various automation systems, from small machines to large-scale production lines supporting a wide range of motion control tasks, including simple point-to-point motion, interpolated motion, electronic gearing, and more complex multi-axis synchronization.



By incorporating G/M code compatibility, EtherCAT SoftMotion enables the use of standard CNC programming techniques and languages, making it easier to integrate with existing CNC systems and other machinery.

G-Code

Standard	
G00	Rapid move (use max feedrate)
G01	Linear move (with specified feedrate)
G02-03	Cicular move
G04	Dwell (i.e. Delay)
G10	L2: Set Coordinate System
G17-19	Select plane for circular move
G28	Reserved
G54-59	Select Coordinate System
G90-91	Select Distance mode. (Absolute or Relative)
G92	Global coordinate offset (i.e. SetPosition)
Extend by ECPWG	
G100	Set max feed for each axis
G101-102	Set acc/dec for each axis

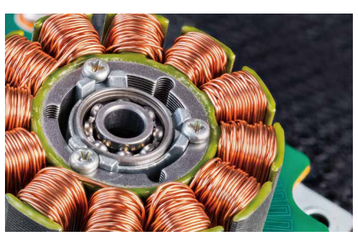
M-Code

Standard	
M00	Pause
M01	Optional Pause
M02	End of program
M03-05	Spindle control
M30	End of program and reset
M97	Jump
M98	Jump to sub-routine
M99	Return from sub-routine

GM code ID	Category
G00-G99	Standard
G100-G499	Extend (defined by ECPWG)
G500-G999	Custom

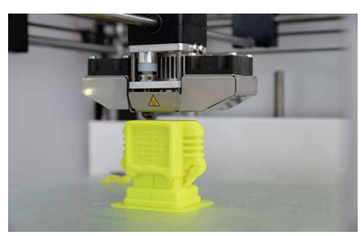
Application

Coil Winding



Drilling machine

3D printing



Architecture

Master

APP / User Application

ECPWG / NCNavi
(G-Code tool)

ECPW/ECATNavi
(Communication tool)

Slave

AXIS

DIO
IO

Nu-Servo

Motion Converter

Pulse

Stepper

Servo

Servo

EtherCAT

Sanyo

Panasonic

Panasonic

Applied

Product line up

Fanless IPC

- Robust and Flexible Fanless Embedded System

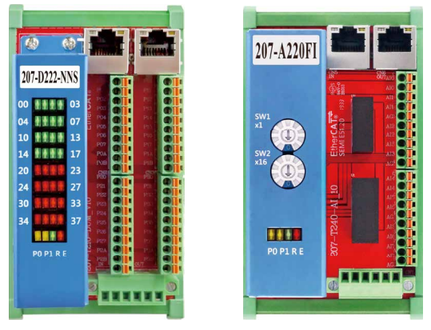
SPC-3204D-ECPW-P10~P60 (By Axis)

INTEL NIC: i210, i211
INTEL CPU Dual Core
Built-in INTime RTOS

Stepper Drives

2-Phase (Closed/Open-Loop)
- EtherCAT CiA402 device profile
- 500~50,000 pulse / revolution
- Current 2.8A~4.2A

5-phase (Micro-Stepping)
- EtherCAT CiA402 device profile
- Resolution 1 ~ 400,000 PPR
- Current 0.75A~ 2.8A
- Constant-current Driving System



Remoto I/O

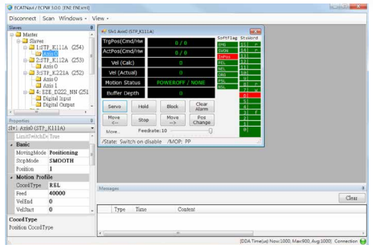
DIO
32-Channel to 96-Channel
- Max. 100Mbps transfer rate
- Easy installation with RJ45 phone jack and LED diagnostic
- Pluggable terminal block with spring plug connectors
- DIP switch for address setting

AIO
8-Channel to 10-Channel
Resolution 12-bit to 16-bit
- Max. 100Mbps transfer rate
- Easy installation with RJ45 phone jack and LED diagnostic
- Pluggable terminal block with spring plug connectors
- DIP switch for address setting

Utility

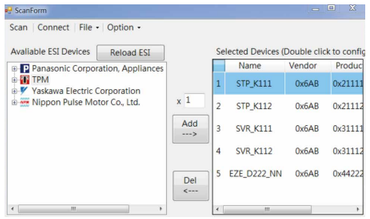
ECATNavi

A GUI tool written in C# for simulating various functions of ECPW Library.



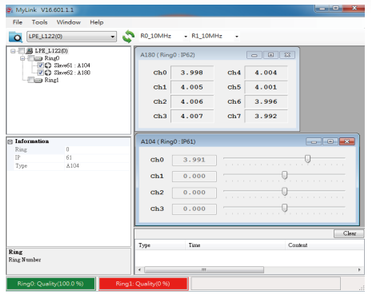
ECATScan

An user-friendly graphic interface for users to generate ENI file and configurate PDO mapping.



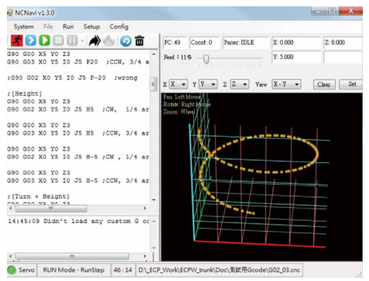
MyDrive

A NuServo stepper drive utility to configure and perform stepper tunning and evaluation.



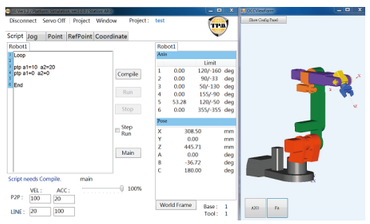
NCNavi

A GUI to edit and execute scripts and to plot the path of axis positioning.



MyRobotPro

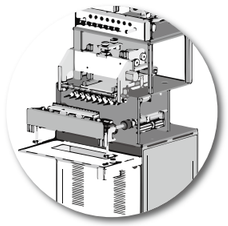
A robot control software featured suite of utility tool to configure and monitor.



ECPW(G) Main Features

Function			ECPW-Pxx	ECPW-Axx	ECPWG-Pxx	ECPWG-Axx
Motion Library	Commend Mode	Sync and Async	●	●	●	●
	Home Mode	CSP Homing	●	●	●	●
	Motion Profile	T-Curve and S-Curve	●	●	●	●
	Interpolation Mode	Linear(All axes),2D/3D Arc,Helical and Cone	●	●	●	●
	Command Buffer	1,000 for all	●	●	●	●
	Change on the Fly	Target Positio and Velocity	●	●	●	●
	Path Smoothing	Fillet and Overlap	●	●	●	●
	Soft Limit	Positive and Negetive	●	●	●	●
	Ring Counter	Rotary Axis	●	●	●	●
	Event Trigger	Realtime Latch and Comparator	●	●	●	●
	Manual Pulse Generator	Movement Follow MPG	●	●	●	●
	E-Gear	Rotating Cut	—	●	—	●
	E-Gear	Flying Cut	—	●	—	●
	E-Gear	Ganrty	—	●	—	●
	G Code	API Implement	—	—	●	●
	G Code	GUI Executor	—	—	●	●
	G Code	G Code User-defined Plugin	—	—	●	●
EtherCAT	LogCapture	Command Recorder	●	●	●	●
	Simulation Mode	Execute without Slave Module	●	●	●	●
	Evaluation Mode	Execute without Real time OS	—	●	—	●

xx = 04: supports 4 axes motion control & i/o
xx = 06: supports 6 axes motion control & i/o
xx = 08: supports 8 axes motion control & i/o
xx = 10: supports 10 axes motion control & i/o
xx = 20: supports 20 axes motion control & i/o
xx = 30: supports 30 axes motion control & i/o
xx = 40: supports 40 axes motion control & i/o
xx = 60: supports 60 axes motion control & i/o



Coil Winding Machine

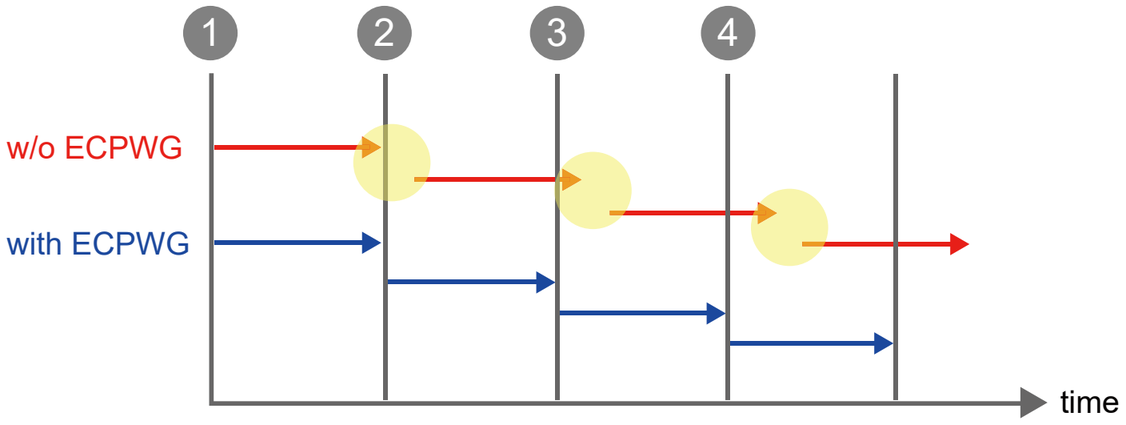
ECPWG Control System for Electrical Coil Winding

Synchronized and coordinated motion between multiple axes is essential for coil winding machines.

The EtherCAT motion controller with built-in INtime® Real-Time OS implements motion control in an automation control system precisely and efficiently.

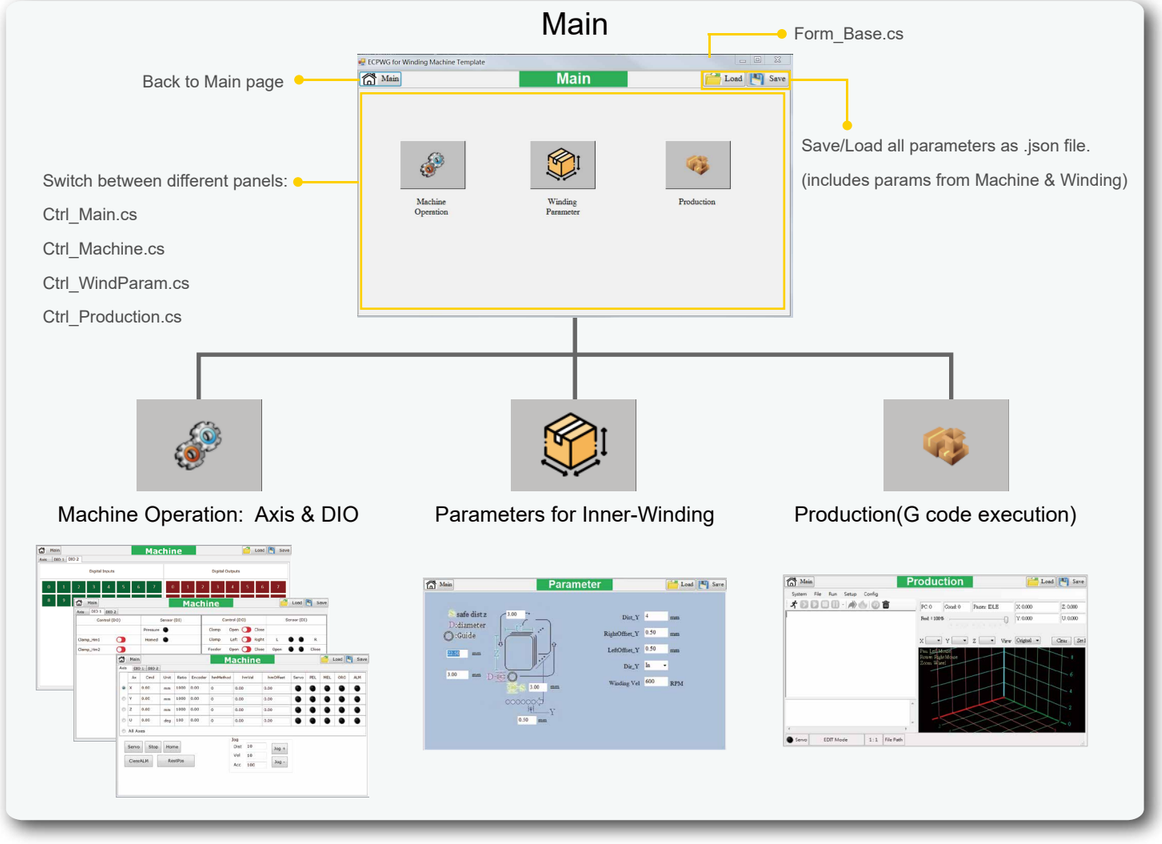
Why TPM?

Types	No. of Axis	Standard CNC Programming	Extensional CNCProgramming	Self-Defined CNC Programming	Generator	LAN	RS-485	RS-232	VGA
Single-Chip Controller (PLC)	2~3	Y	N	N	N	0	1	0	N
IPC + Pulse Control (PAC)	4~6	N(Needs to be developed by users)	N(Needs to be developed by users)	N(Needs to be developed by users)	Y	1	1	1	Y
TPM IPC + Pulse Control (PAC)	4	Y	Y	Y	Y	2	1	3+1	Y
TPM Controller	10	Y	Y	Y	Y	1	2+1	5+1	Y

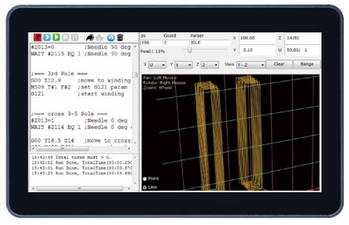


ECPWG provides abundent utilities to parse and execute the G code file under INtime® Real-time system.

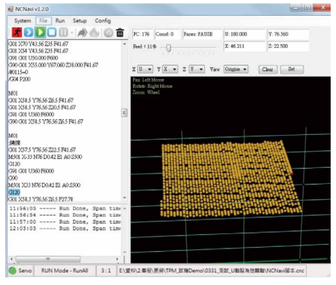
Resource Code Releases



HMI



NCNavi



- **ECPW(G):**

Simply create motion algorithms written in C++, C#, under Visual Studio IDE using with APIS.

Robust and high performance embedded motion control under INtime® real-time OS.

Simulation Mode allows user to operate ECATNavi without connecting any slave modules for the pretest purpose.

Achieve complex tasks without the need for an expensive PLC or motion controller.

Digital I/O Slave(DIO)

Models	Input		Output		Current	Total channels
	channels	NPN PNP	channels	NPN PNP		
207-D204-XPS	—	—	32	●	100mA/CH	32
207-D204-XNS	—	—	32	●	100mA/CH	32
207-D222-NNS	16	●	16	●	±5mA	32
207-D222-PPS	16	●	16	●	±5mA	32
207-D240-PX	32	●	—	—	±5mA	32
207-D240-NX	32	●	—	—	±5mA	32
207-D402H-XPS	—	—	16	●	500mA/CH	16
207-D402H-XNS	—	—	16	●	500mA/CH	16
207-D411H-PPS	8	●	8	●	±5mA	16
207-D411H-NNS	8	●	8	●	±5mA	16
207-D521-PPS	32	●	16	●	±5mA	48
207-D521-NNS	32	●	16	●	±5mA	48
207-D522-PPS	32	●	32	●	±5mA	64
207-D522-NNS	32	●	32	●	±5mA	64
207-D532-PPS	48	●	32	●	±5mA	80
207-D532-NNS	48	●	32	●	±5mA	80
207-D533-PPS	48	●	48	●	±5mA	96
207-D533-NNS	48	●	48	●	±5mA	96
207-D540-PX	64	●	—	—	±5mA	64
207-D540-NX	64	●	—	—	±5mA	64
207-D542-PPS	64	●	32	●	±5mA	96
207-D542-NNS	64	●	32	●	±5mA	96
207-D560-PX	96	●	—	—	±5mA	96
207-D560-NX	96	●	—	—	±5mA	96

Analog I/O Slave(AIO)

Models	Input				Output			
	channels	Effective resolution	accuracy	range	channels	Effective resolution	accuracy	range
207-A202F	—	—	—	—	4	16 bits	±0.1% (F) ±0.05% (FH)	±10V
207-A204F	—	—	—	—	8	16 bits	±0.1%	±10V
207-A220F	8	16 bits	±0.2%	Single End : ±10V Differential : ±10V	—	—	—	—
207-A220FI	8	16 bits	±0.5%(FI)	Single End: 4~20mA	—	—	—	—
207-A221FC	8	16 bits	±0.2%	Single End : ±10V Differential : ±10V	2	12 bits	—	±10V

EtherCAT 2-Axis Pulse - Train Controller

Models	Communication type	Distributed Clock	ID switch	Axis
207-M3A2-GEN	DC	0.5/1/2/4 ms	8 bits	2

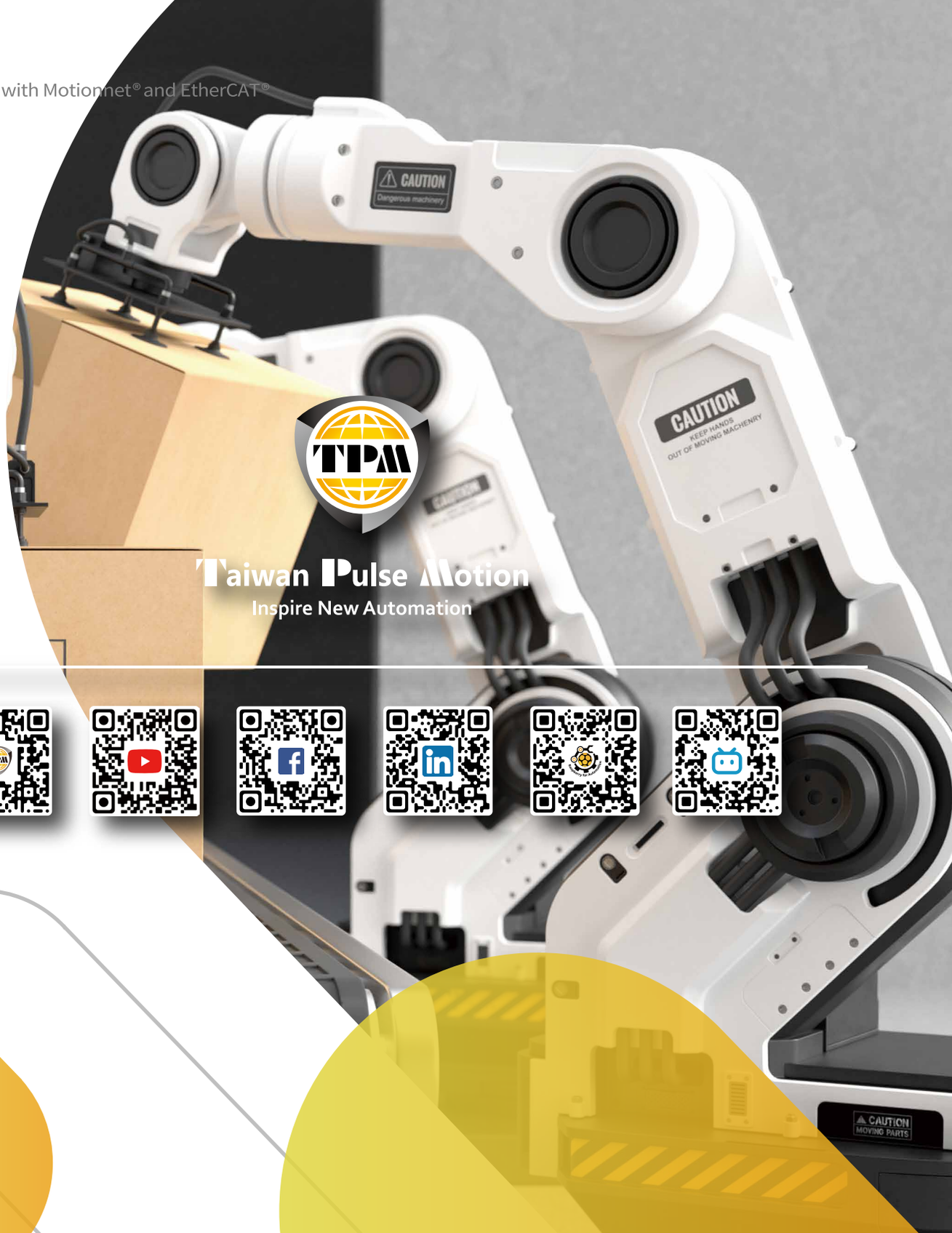
EtherCAT 4-Channel Encoder with CMP and LTC

Models	Communication type	Distributed Clock	ID switch	Channels
207-C344F	DC	0.5/1/2/4 ms	8 bits	4

Nu-Servo®

Models	2-phase	5-phase	Axis	Current
STP-K512A	—	●	1	2.8A
STP-K511A	—	●	1	1.4A
STP-K510A	—	●	1	0.75A
STP-K221A	●	—	2	2.2A
STP-K112A	●	—	1	4.2A
STP-K111A	●	—	1	2.8A
STP-K2241A	●	—	4	1.8A
SVR-K711	2 / BLDC	—	1	8.0A
SVR-K312	●	—	1	4.2A
STP-K521	—	●	2	1.4A
STP-K2541A	—	●	4	1.4A

Distributed Control with Motionnet® and EtherCAT®



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