

Googol Technology (HK) Limited

Motion Control Products Training 2

September 2019

Product Categories of GoogolTech



Plug-in motion control card



Embedded motion controller



Network motion controller



High performance servo drive



Intelligent drive



Spindle servo drive



Kestrel smart camera



HMI



I/O module

Motion Control Card's Feature Table



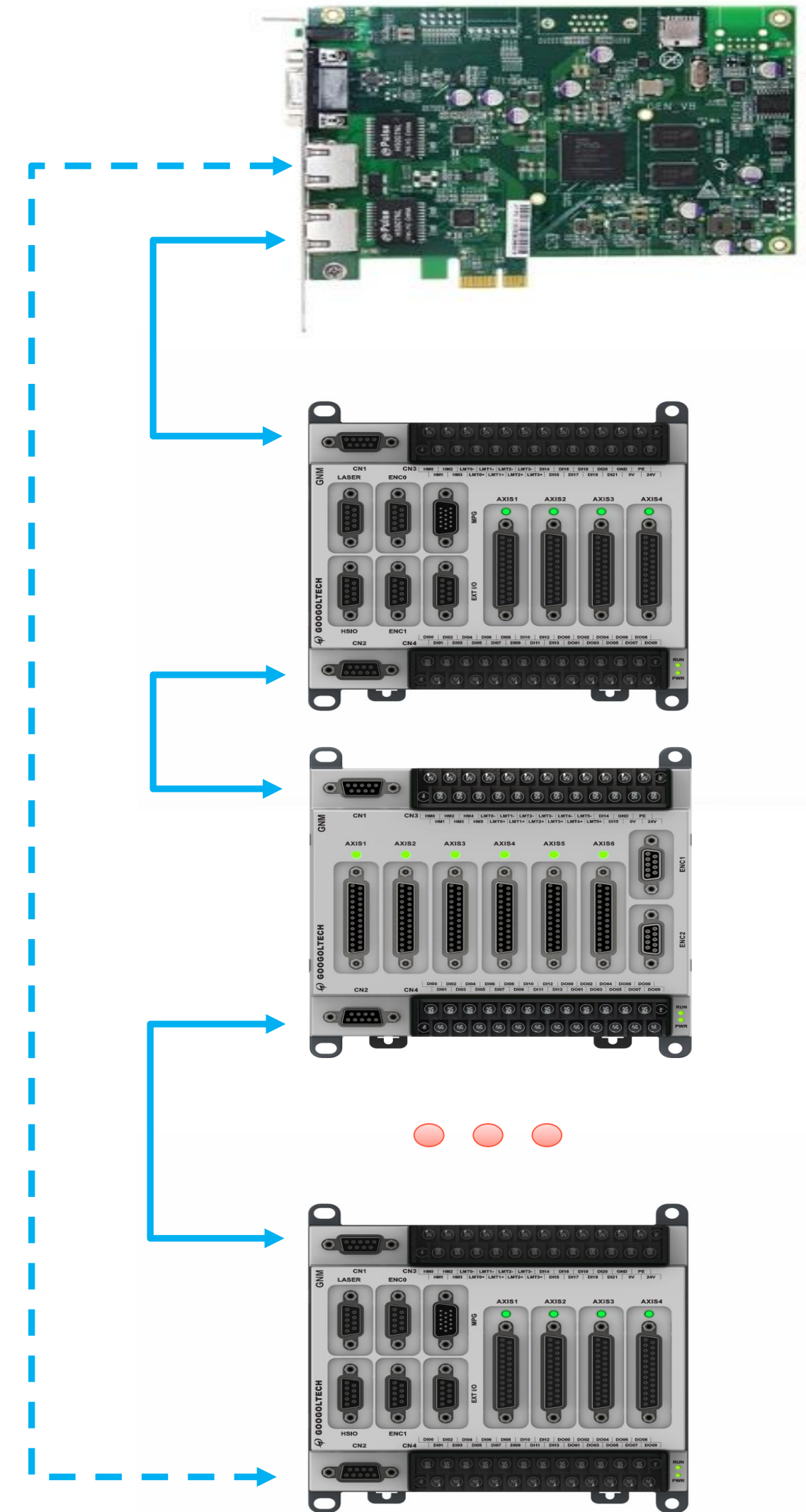
Feature	PCI	PCIe	Multi-axis	Abundant axes			Network		Advanced algorithm	User-defined algorithm
			4/8	24	48	64	gLink-II	EtherCAT		
Series	GTS-VB	GTS-PCIe	GTS-VB GTS-PCIe							
		GTN		GTN			GTN			
		GSN			GSN		GSN		GSN	
		GEN				GEN		GEN		
		GHN		GHN			GHN			GHN

Card/Modul Connection Type

GTS, GTS-PCIe



GTN
GSN
GHN



Motion Control Card Series

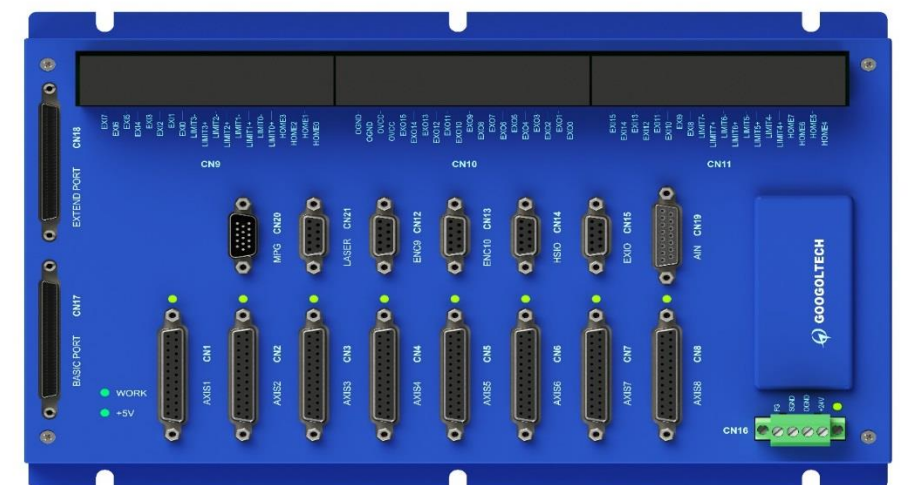
- GTS-VB Motion Control Card
- GTS-PCIe Motion Control Card
- GTN Network Motion Control Card
- GSN Network Motion Control Card
- GHN Network Motion Control Card

GTS-VB Motion Control Card



Function Feature

- **Number of controlled axis:** 4 / 8 axes, pulse / analog command output
- **Control cycle:** 250μs
- **Pulse output:** maximum frequency 4MHz
- **Maximum encoder input:** maximum frequency 8MHz
- **Analog output:** range: -10V ~+10V
- **Hardware capture:** Index / Home / Probe
- **Jog motion**
- **Point-to-point motion:** S-curve, T-curve
- **Synchronized motion:** electronic gearing, electronic cams motion
- **PT motion:** position time motion mode
- **PVT motion:** position velocity time motion mode
- **Interpolation motion:** linear, arc, helical and other motion modes
- **Control strategy:** PID control with velocity / acceleration feedforward
- **Safety measure:** following error limit, output voltage saturation limit
- **Standard homing:** international standard homing mode
- +/- limit signal input, optocoupler isolation for each axis
- 1-channel home signal input optocoupler isolation for each axis
- 1-channel drive alarm signal input, optocoupler isolation for each axis
- 1-channel drive enabled output, optocoupler isolation for each axis
- 1-channel drive reset signal output, optocoupler isolation for each axis
- 16-channel digital signal input, optocoupler isolation
- 16-channel digital signal MOS output, maximum 450mA
- 2-channel differential position comparison signal output
- 8-channel voltage mode analog input, range: -10V ~+10V
- Extension IO interface: can connect up to 256 digital IOs, or 64 analog inputs and 48 analog outputs
- 2-channel auxiliary encoder input
- **Laser dedicated interface: 2-channel PWM wave output, 5V differential signal**
- **Dedicated MPG interface**

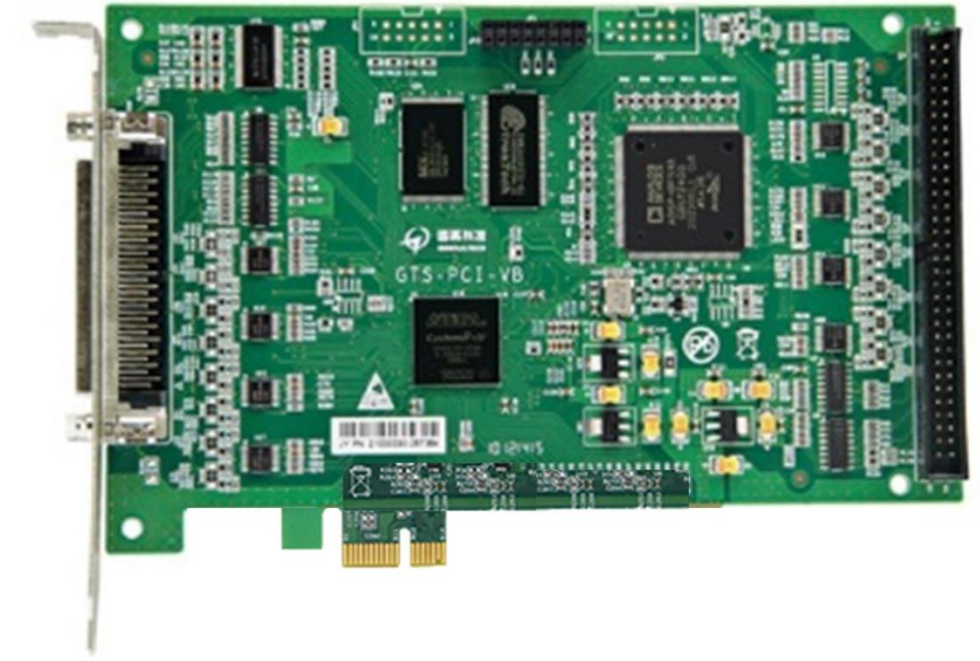


GTS-PCIe Motion Control Card



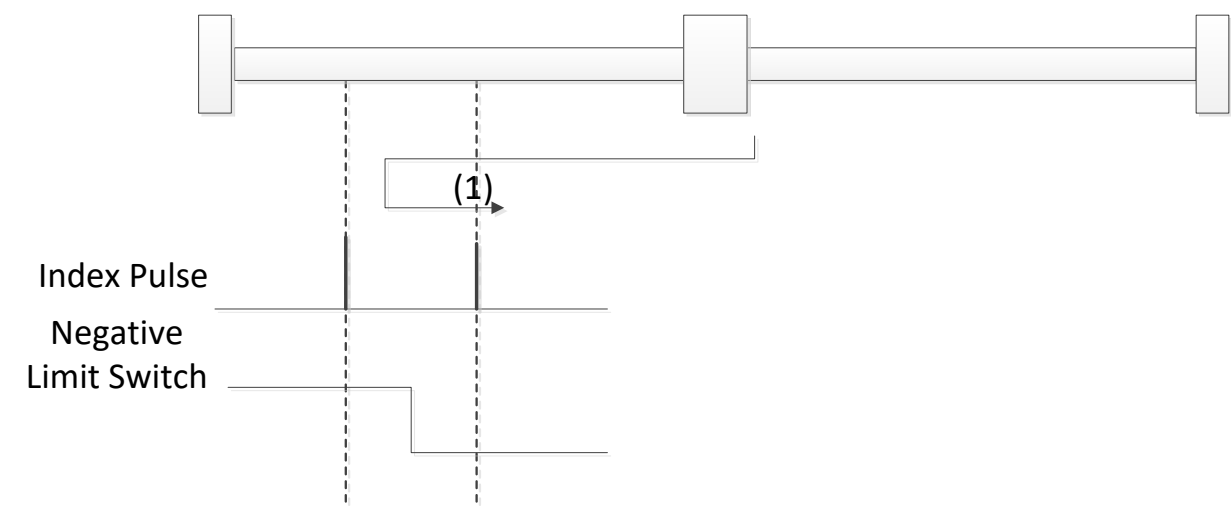
Function Feature

- **PCIe bus interface**
- **Number of controlled axis:** 4 / 8 axes, pulse / analog command output
- **Control cycle:** 250μs
- **Pulse output:** maximum frequency 4MHz
- **Encoder input:** maximum frequency 8MHz
- **Analog output:** range: -10V ~ +10V
- **Hardware capture:** Index / Home / Probe
- **Jog motion**
- **Point-to-point motion:** S-curve, T-curve
- **Synchronized motion:** electronic gearing, electronic cams motion
- **PT motion:** position time motion mode
- **PVT motion:** position velocity time motion mode
- **Interpolation motion:** linear, arc, helical and other motion modes:
- **Control strategy:** PID control with velocity / acceleration feedforward
- **Safety measure:** follow error limit, output voltage saturation limit
- **Standard homing:** international standard homing mode
- +/- limit signal input, optocoupler isolation for each axis
- 1-channel home signal input, optocoupler isolation for each axis
- 1-channel drive alarm signal input, optocoupler isolation for each axis
- 1-channel drive enabled signal output, optocoupler isolation for each axis
- 1-channel drive reset signal output, optocoupler isolation for each axis
- 16-channel digital signal input, optocoupler isolation
- 16-channel digital signal MOS output, maximum 450mA
- 2-channel differential position comparison signal output
- 8-channel voltage analog input, range: -10V~+10V
- Extension I/O interface: can connect up to 256 digital IOs, or 64 analog inputs and 48 analog outputs
- 2-channel auxiliary encoder input
- **Laser dedicated interface:** 2-channel PWM wave output, 5V differential signal
- **Dedicated MPG interface**
- **Command functions are completely compatible with GTS-VB**
- **Driver update is required**
- **dll and MCT2008 updates are required**

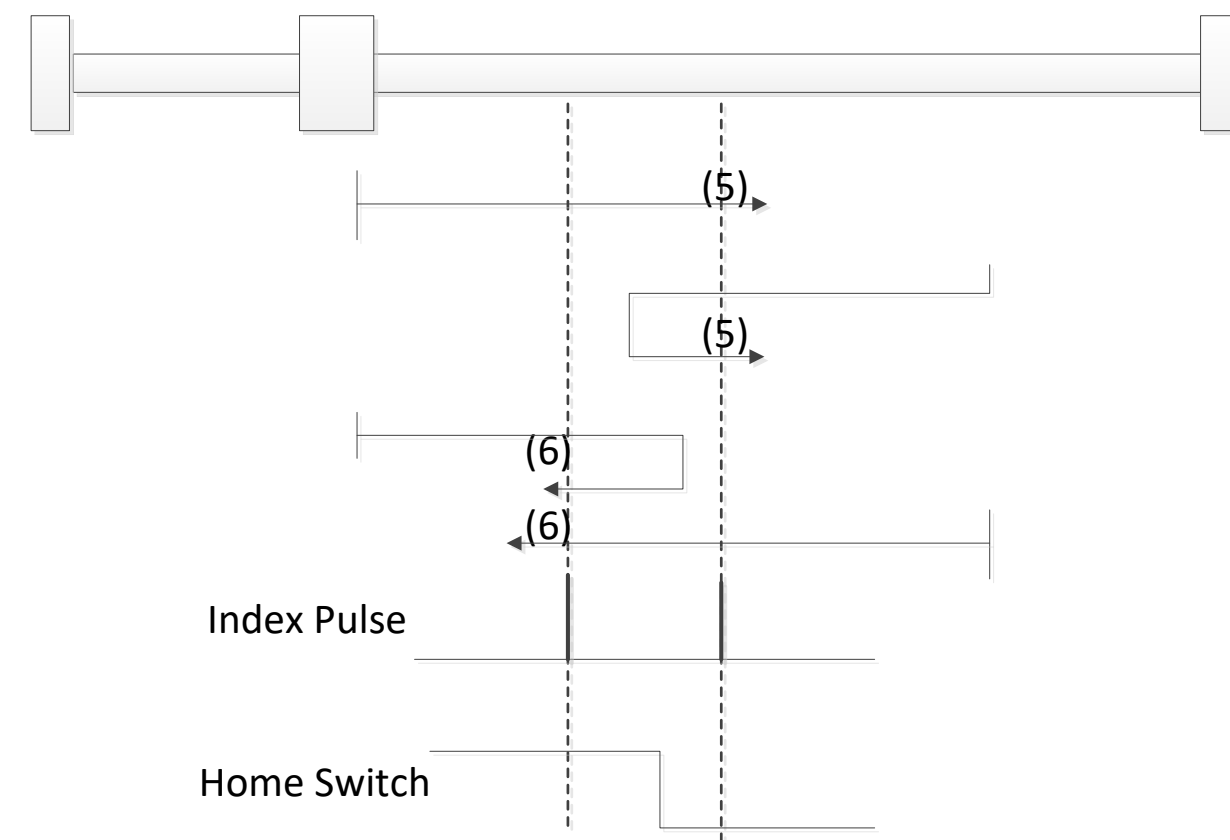


GTS Supported Axis Homing Mode

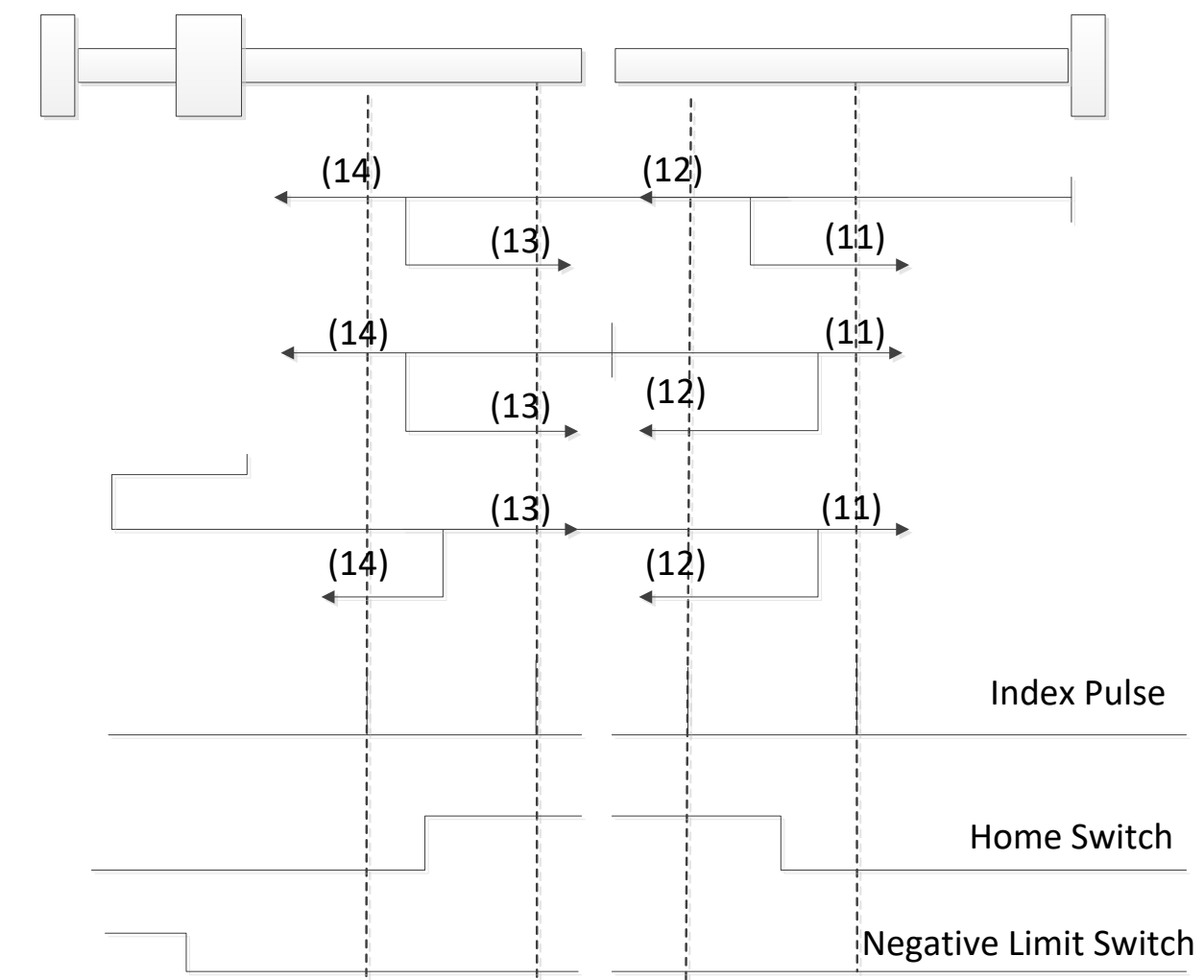
Limit + Index



Home + Index



Limit + Home + Index



36 types of homing mode

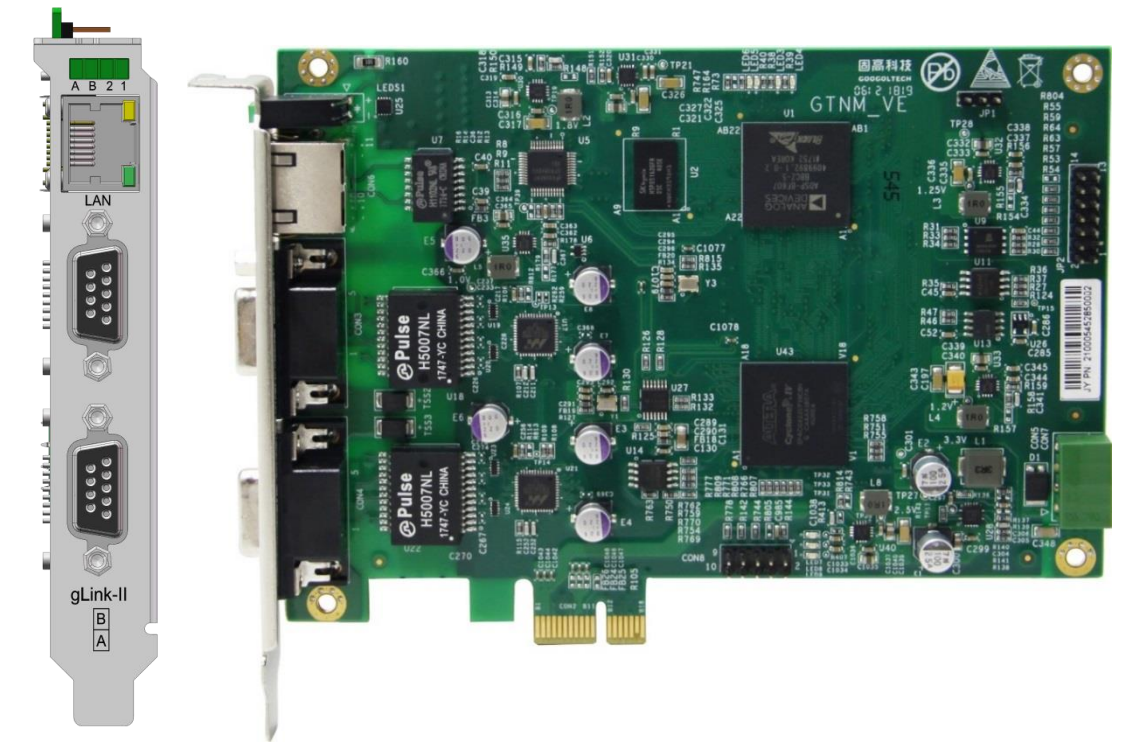
BS EN 61800-7-201:2008 standard

GTN Network Motion Control Card



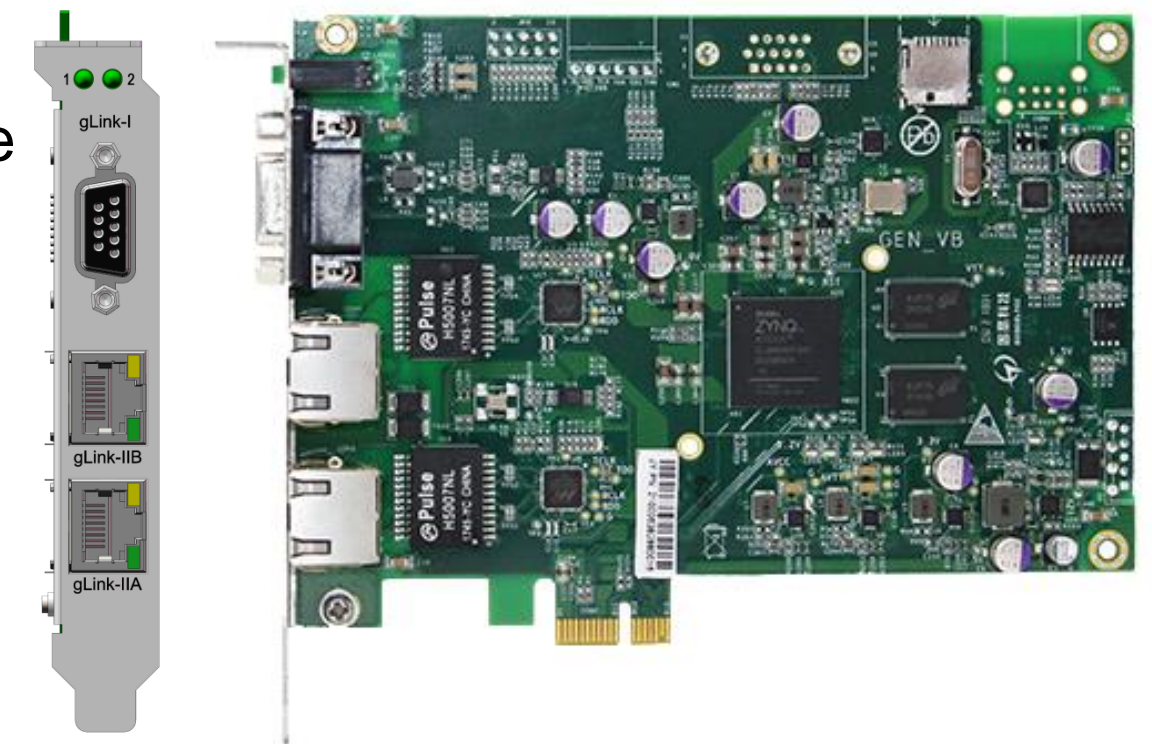
Function Feature

- **gLink-II network connection, modularized extension**
- **Number of controlled axis: 16 / 24 axes**, pulse or analog command output
- **GT command system can be used if number of axis ≤ 12**
- **Support DMA command transfer**
- **Control cycle:** 250 μ s / 500 μ s
- **Pulse output:** maximum frequency 4MHz
- **Encoder input:** maximum frequency 8MHz
- **Analog output:** range: -10V ~ +10V
- **Hardware capture:** Index / Home / Probe
- **Jog motion**
- **Point-to-point motion:** S-curve, T-curve
- **Synchronized motion:** electronic gearing, electronic cams motion
- **PT motion:** position time motion mode
- **PVT motion:** position velocity time motion mode
- **Interpolation motion:** linear, arc, helical and other motion modes
- **Control strategy:** PID control with velocity / acceleration feedforward
- **Safety measure:** following error limit, output voltage saturation limit
- **Standard homing:** international standard homing mode
- **Encryption function:** built-in power failure memory chip, encryption chip
- +/- limit signal input, optocoupler isolation for each axis
- 1-channel home signal input, optocoupler isolation for each axis
- 1-channel drive alarm signal input, optocoupler for each axis
- 1-channel drive enabled signal output, optocoupler isolation for each axis
- 1-channel drive reset signal output, optocoupler isolation for each axis
- 2-channel differential position comparison signal output for each GNM module
- 10-channel digital signal MOS output, maximum 450mA for each GNM module
- 16-channel (GNM-60X) / 22-channel (GNM-40X) digital signal input, optocoupler isolation for each GNM module
- 8-channel voltage mode analog input (GNM-401), range: -10V ~ +10V
- Extension IO interface (except GNM-602): can connect up to 256 digital IOs, or 64 analog inputs and 48 analog outputs
- Laser / galvo scanner interface (GNM-403): 1-channel PWM wave differential signal output and 1-channel laser switch signal (5V/24V selectable via dial switch), 1-channel analog output, 1-channel digital galvo scanner output
- Dedicated MPG input interface (except GNM-602), 2-channel auxiliary encoder input (GNM-402 / GNM-602)

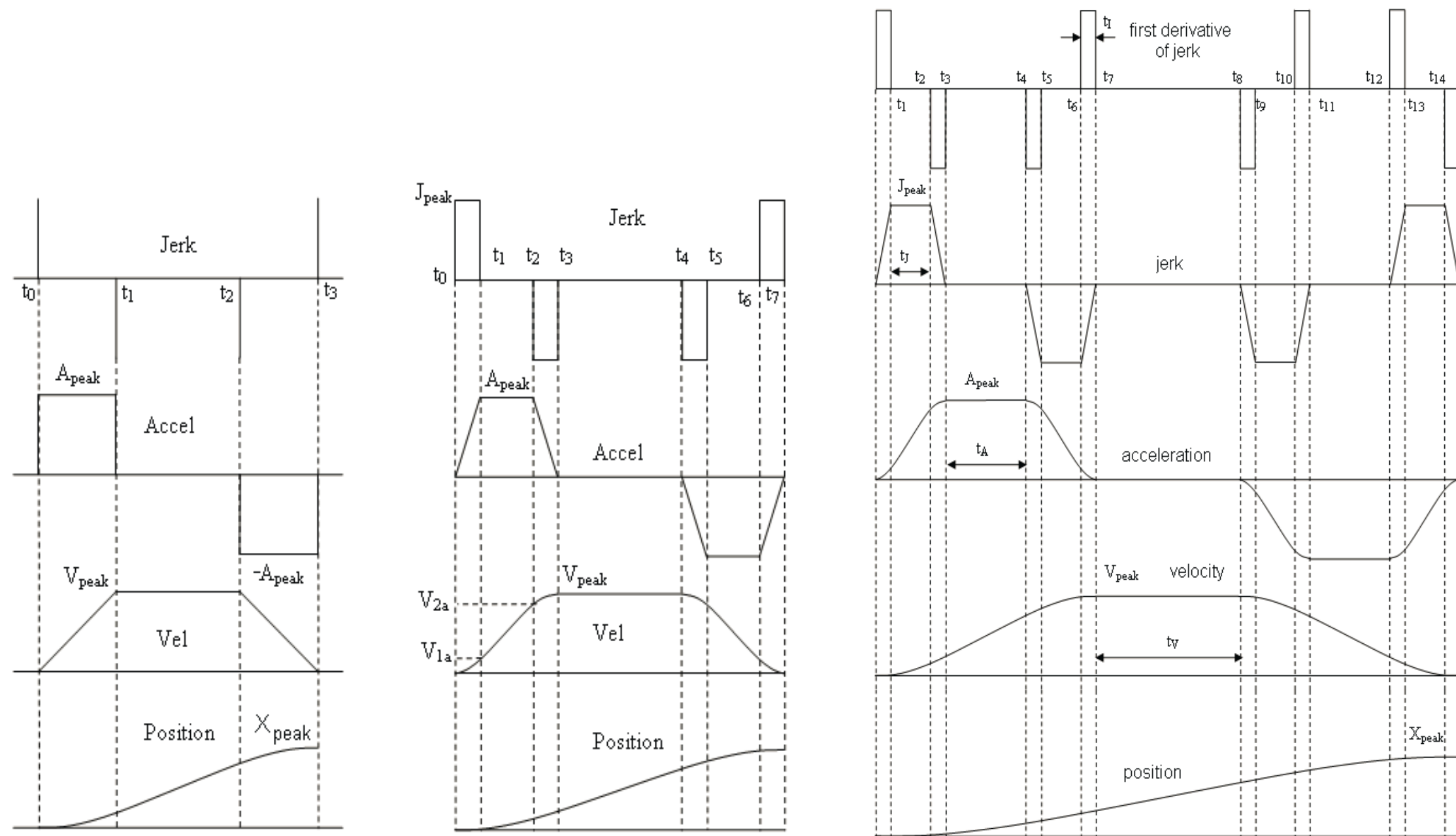


Function Feature

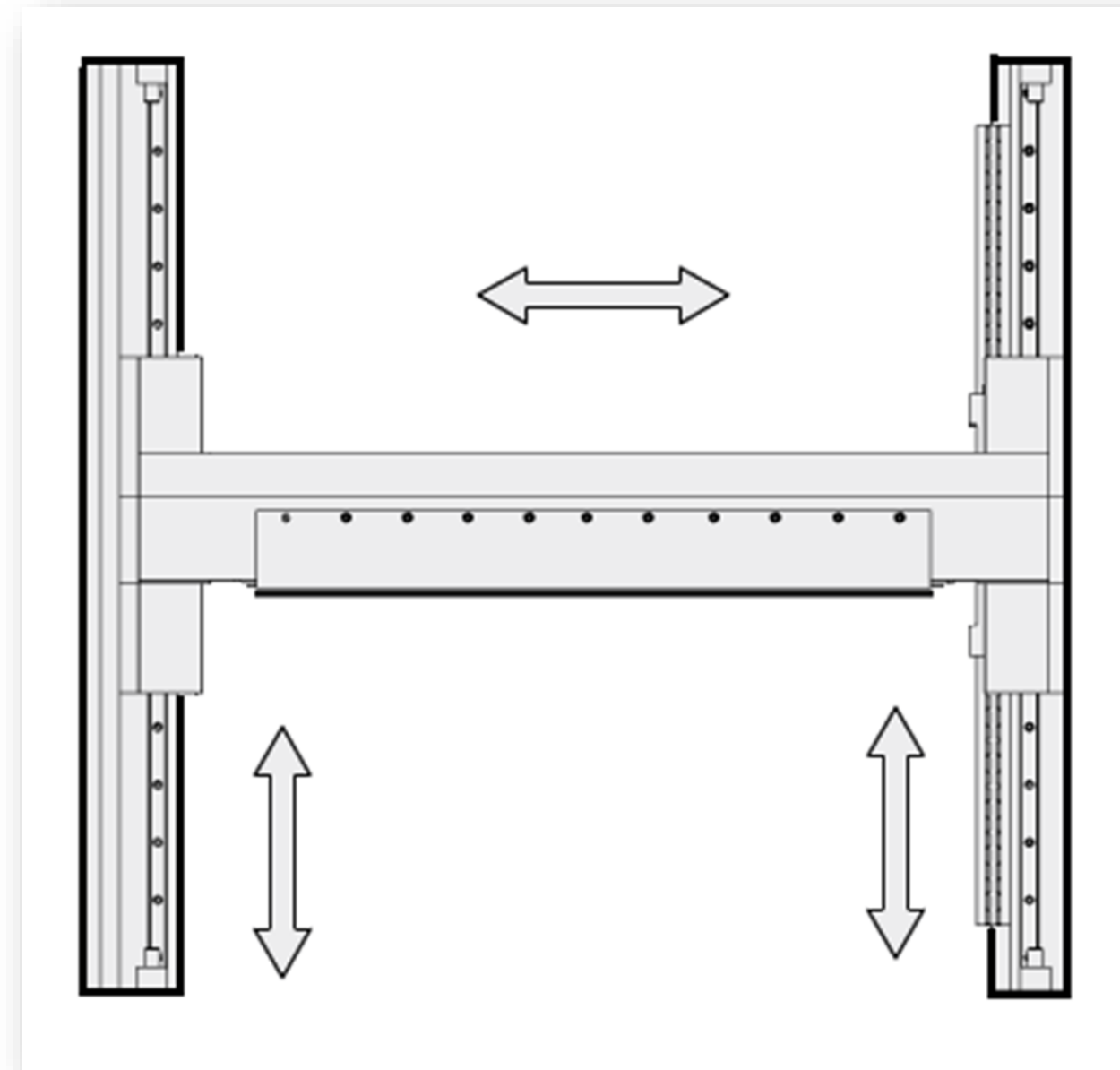
- gLink-II network interface, support modularized extension
- **Number of controlled axis: 24 / 48 axes**, pulse or analog command output
- GT command system can be used if number of axes ≤ 24
- Support DMA command transfer
- **Control cycle:** 250 μ s / 500 μ s
- **Pulse output:** maximum frequency 4MHz
- **Encoder input:** maximum frequency 8MHz
- **Analog output:** range: -10V ~ +10V
- **Hardware capture:** Index / Home / Probe
- **Jog motion**
- **Point-to-point motion:** S-curve, T-curve
- **Synchronized motion:** electronic gearing, electronic cams motion
- **PT motion:** position time motion mode
- **PVT motion:** position velocity time motion mode
- **Interpolation motion:** linear, arc, helical and other motion modes
- **Control strategy:** PID control with velocity / acceleration feedforward
- **Safety measure:** following error limit, output voltage saturation limit
- **Standard homing:** international standard homing mode
- **Encryption function:** built-in power failure memory chip, encryption chip
- **High order S-curve acceleration / deceleration motion**
- **Support 5-axis interpolation motion of RTCP**
- **Built-in forward and inverse robot kinematics, robot dynamics**
- **Multiple gantry cross coupling synchronized closed loop control**
- **High speed and high precision contour control algorithm**
- **PSO(Position Synchronized Output) function, trajectory direction equal interval output up to 4MHz**
- **Infinite width galvo scanner function, combination of galvo scanning and XY table, synchronization cycle 10 μ s**
- **Following processing function**
- **Multi-dimension error compensation function**



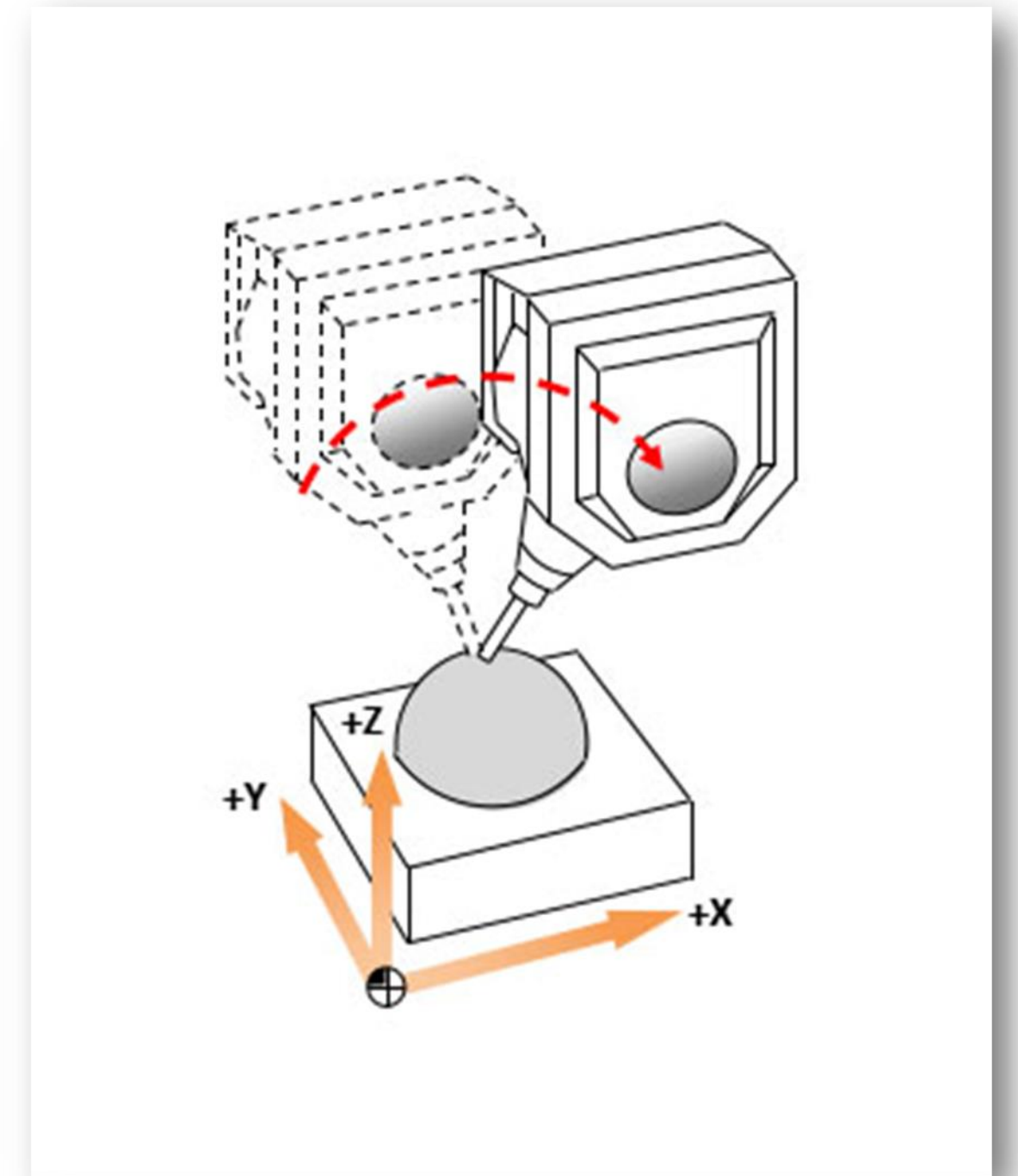
GSN High-End Function Features #1



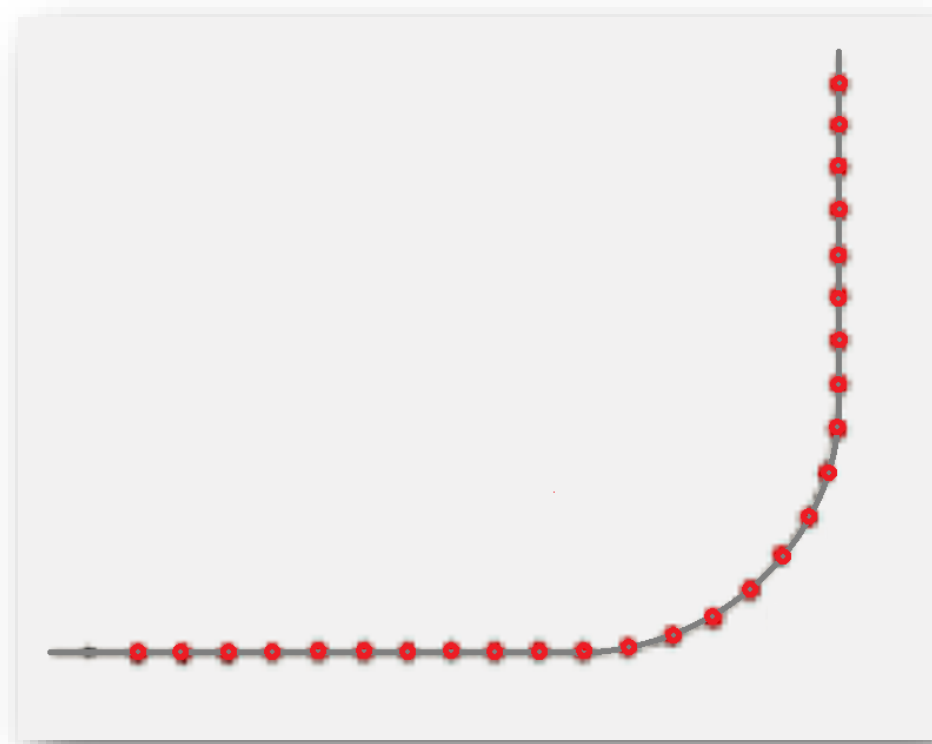
S-Curve acceleration slope



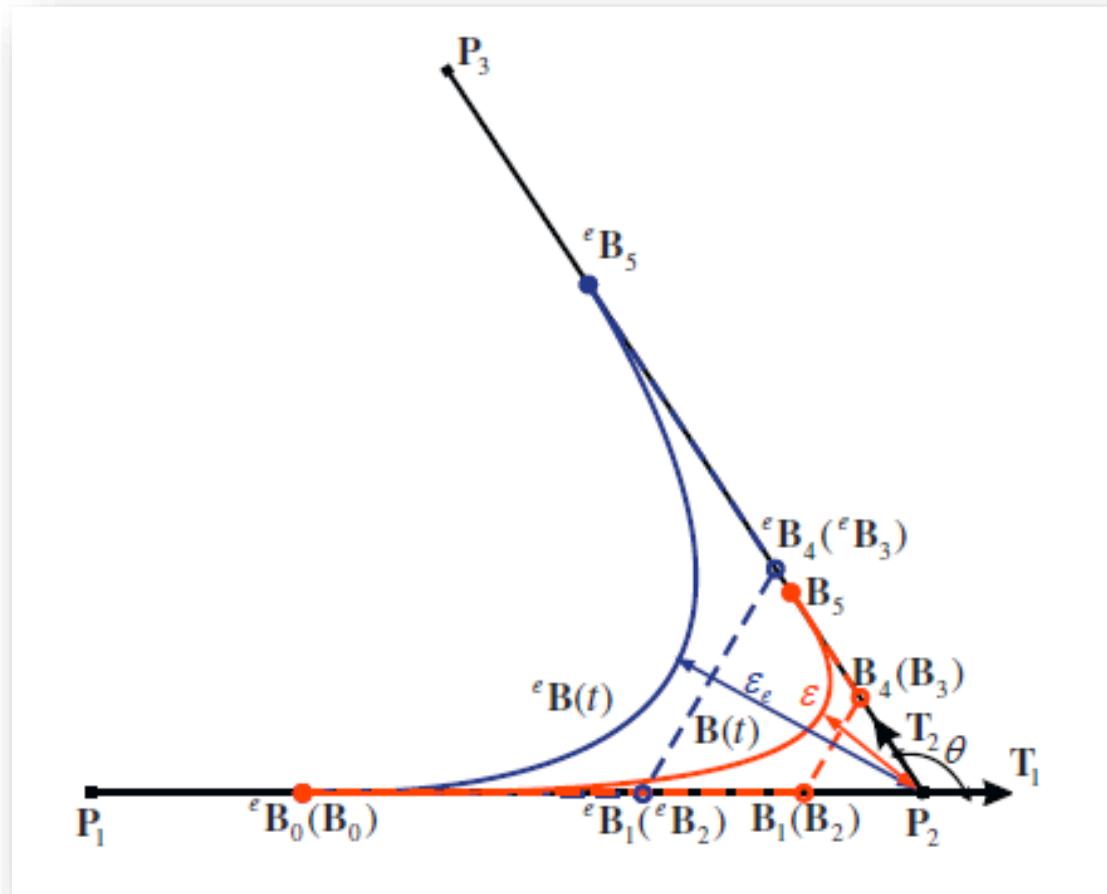
Gantry Motion Control



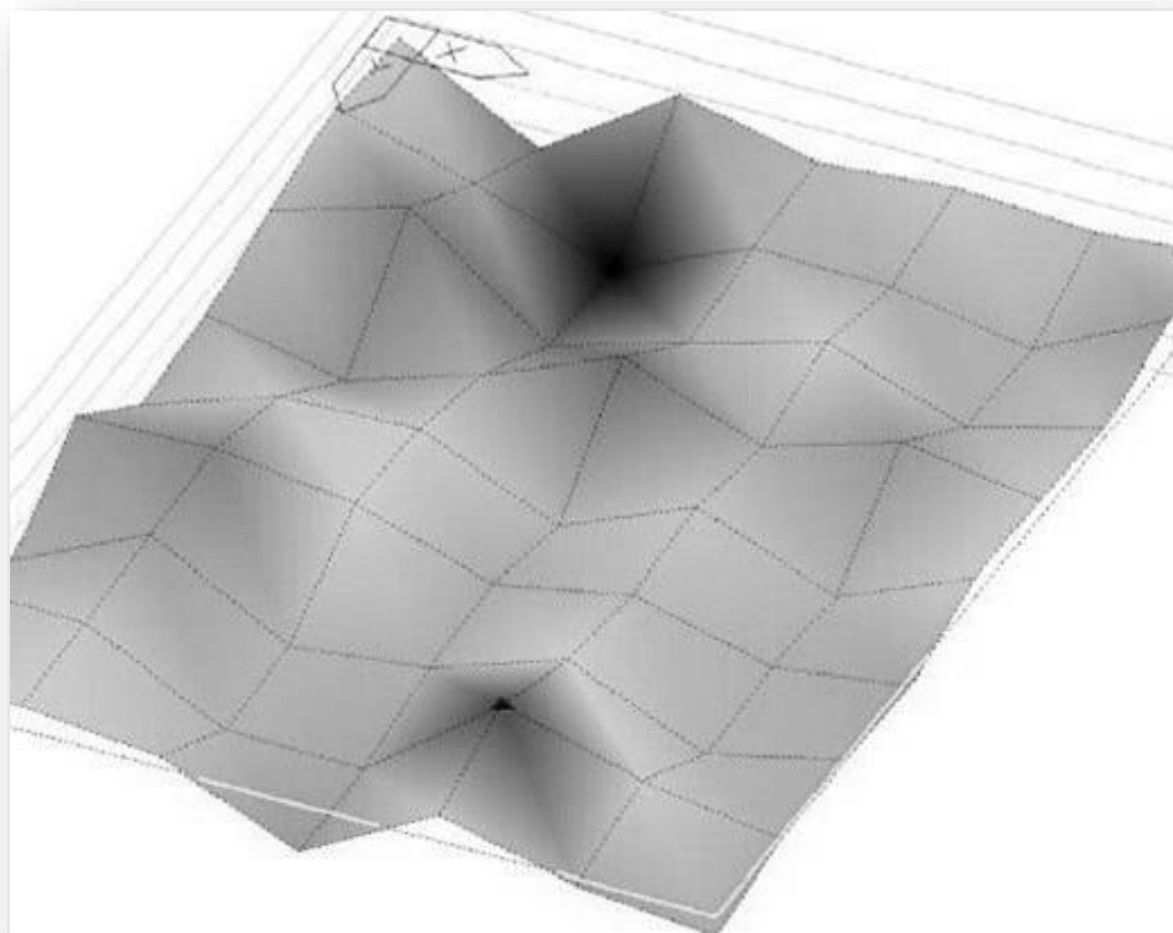
5-Axis RTCP



Precision PSO



Sharp Corner Deceleration



High Dimension Error Compensation

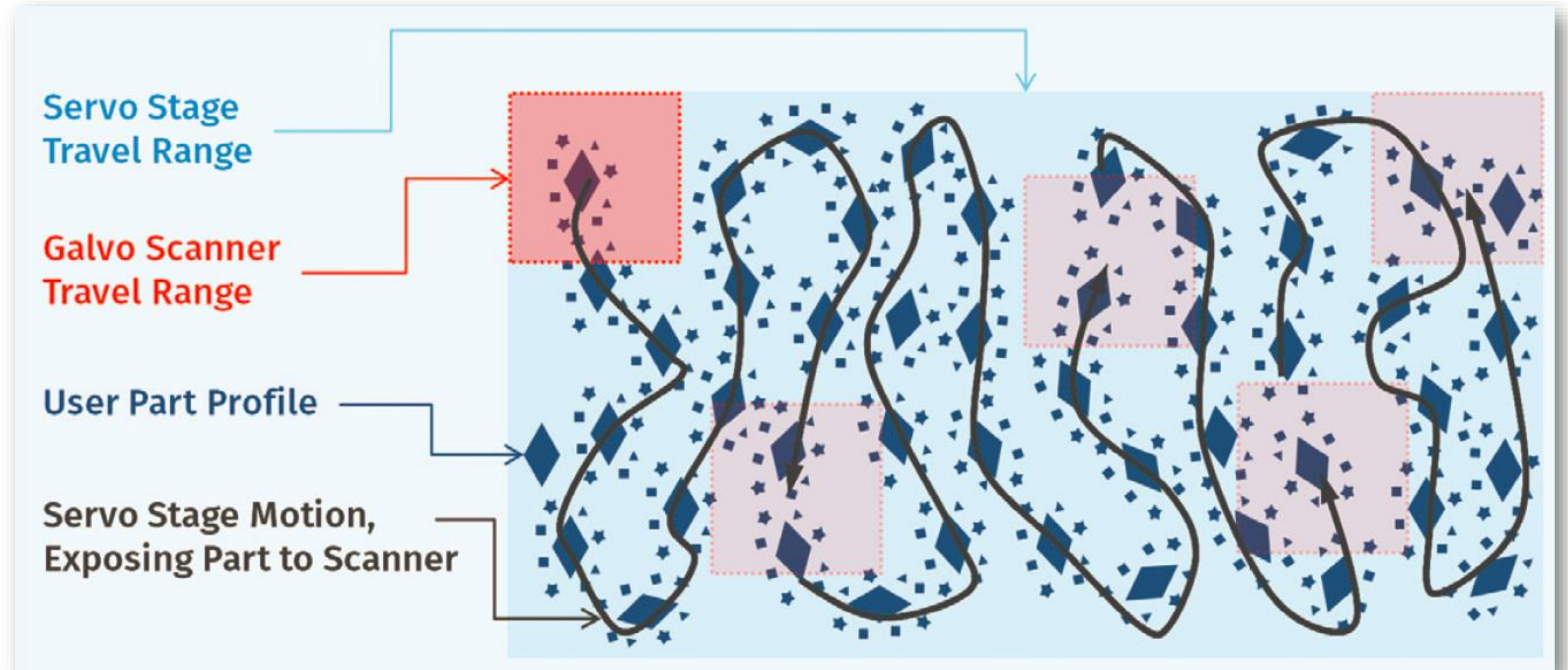


Figure Segmentation Laser Galvo Scanner

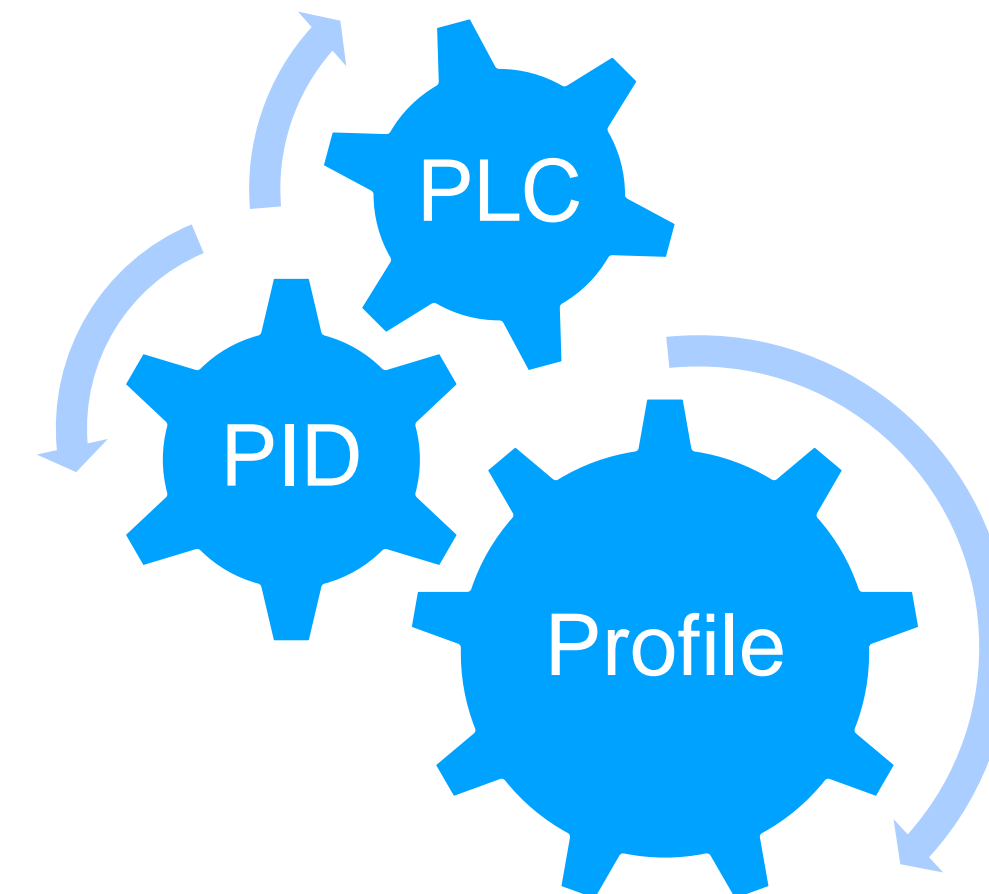
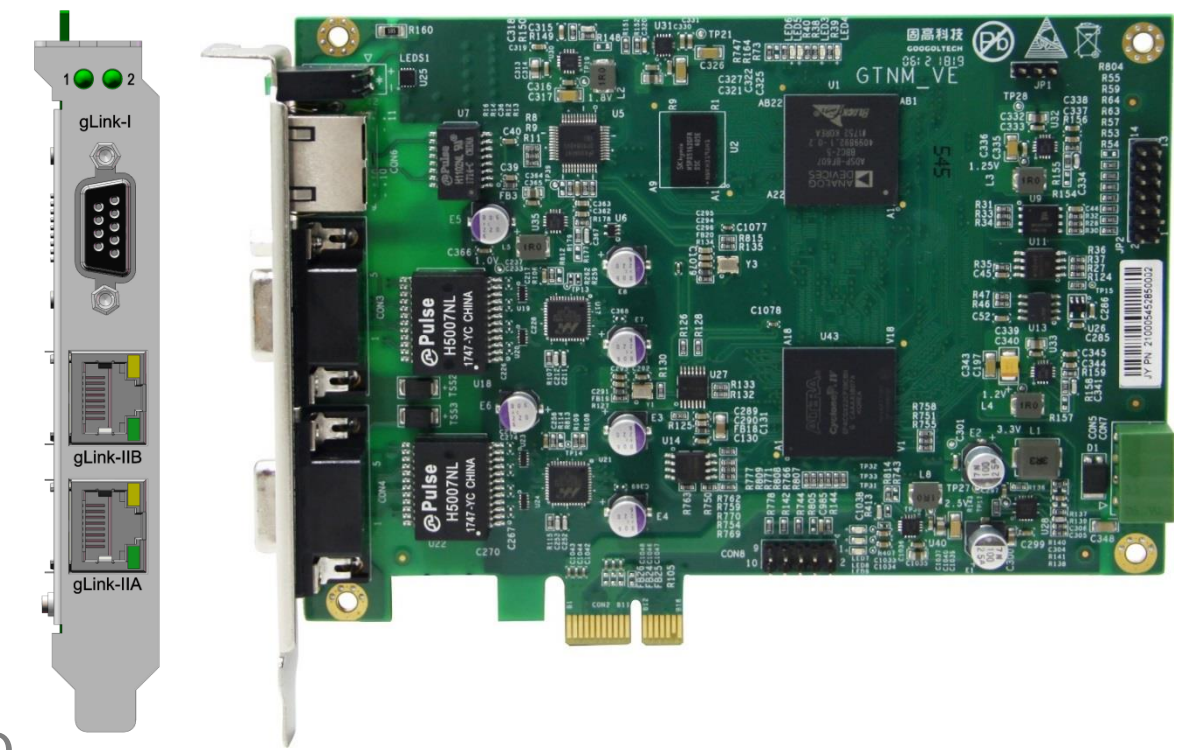
GHN Network Motion Control Card (User Customized Algorithm)



Function Feature

- gLink-II network connection, modularized extension
- **Number of controlled axis: 24 axes**, pulse or analog command output
- GT command system can be used if number of axis ≤ 12
- Support DMA command transfer
- **User-defined control algorithm (DLM)**
- **Control cycle:** 250 μ s / 500 μ s
- **Pulse output:** Maximum frequency 4MHz
- **Encoder input:** Maximum frequency 8MHz
- **Analog output:** range: -10V ~ +10V
- **Hardware capture:** Index / Home / Probe
- **Jog motion**
- **Point-to-point motion:** S-curve, T-curve
- **Synchronized motion:** electronic gearing, electronic cam motion
- **PT motion:** position time motion mode
- **PVT motion:** position velocity time motion mode
- **Interpolation motion:** linear, arc, helical and other motion modes

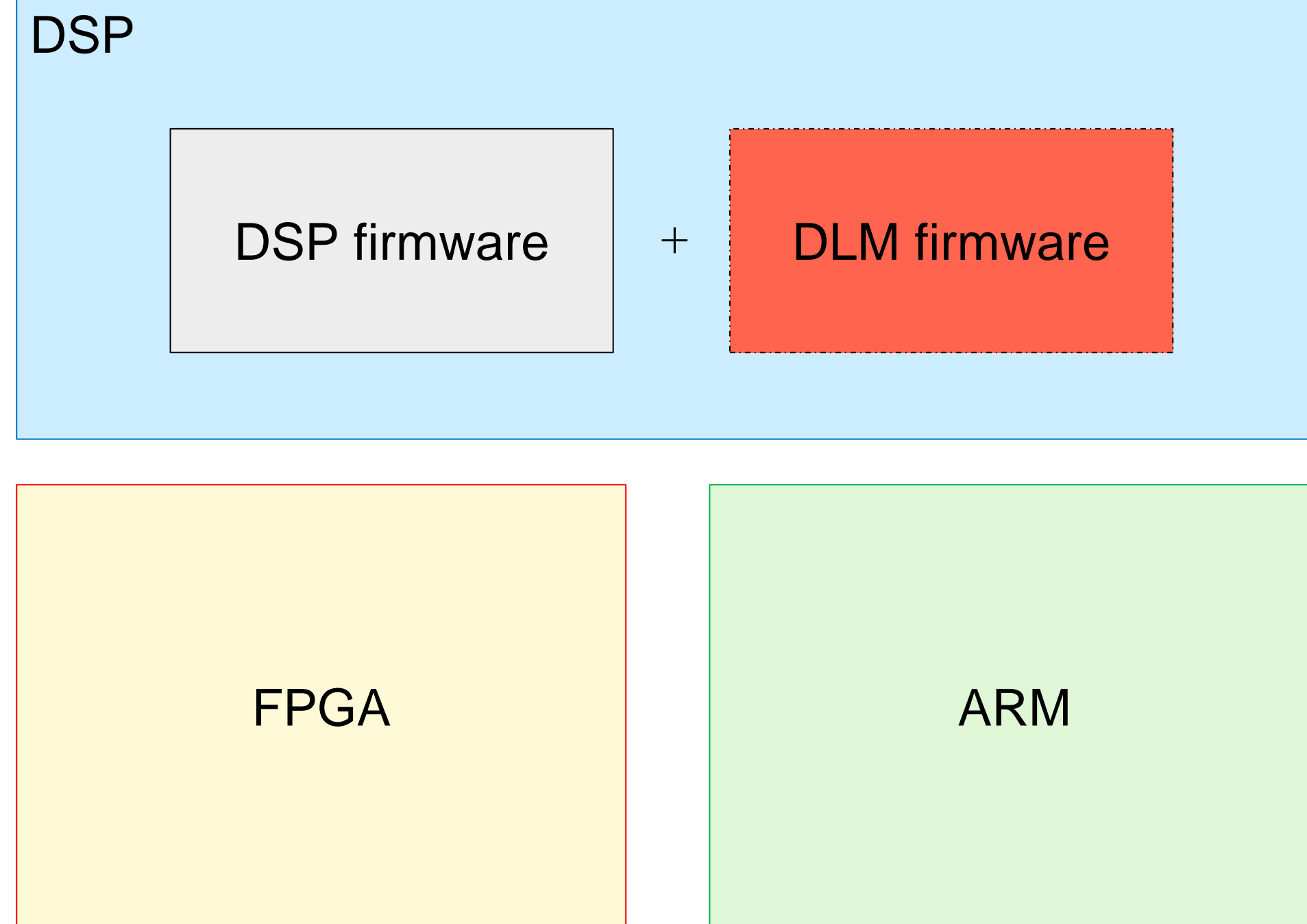
- **Control strategy:** PID control with velocity / acceleration feedforward
- **Safety measure:** following error limit, output voltage saturation limit
- **Standard homing:** international standard homing mode
- **Encryption mode:** built-in power failure memory chip, encryption chip



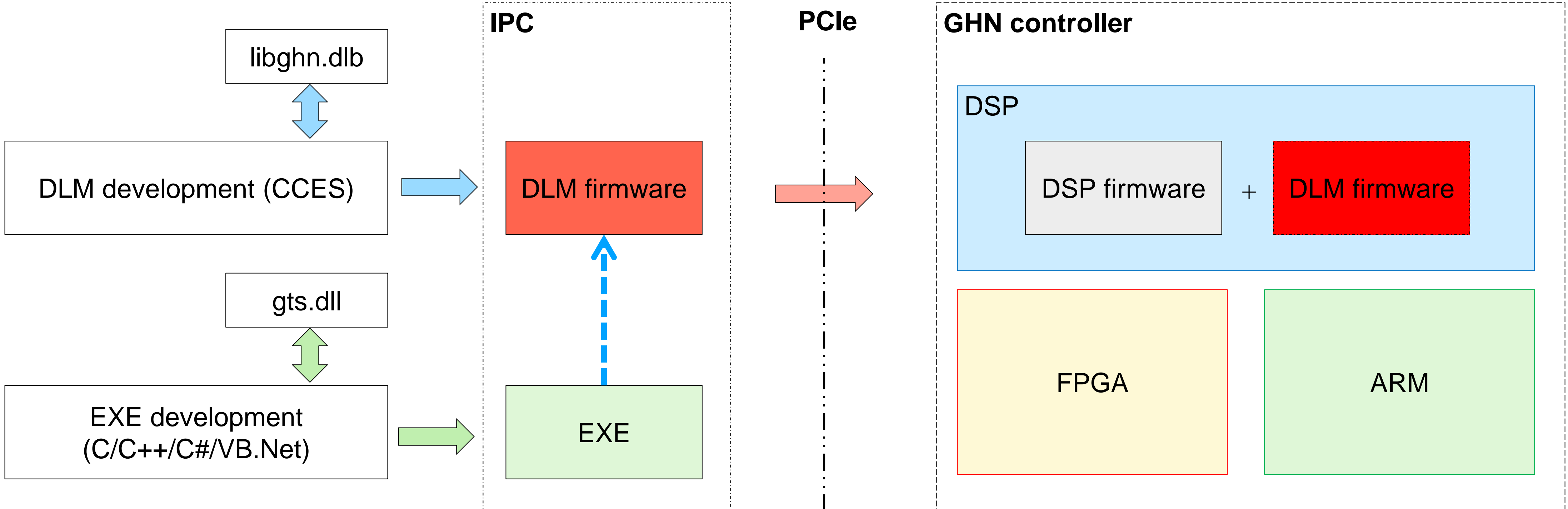
DLM (Dynamic Load Module)

- C Language programming
- CCES editing, compiling, debugging
- Compile to machine code, execute on DSP directly
- Can be embedded to DSP for timer interruption, background task, and command system
- Can receive controller log
- Can call GT commands
- Can be downloaded and executed dynamically when operating

GHN controller



DLM Development And Application



GTN/GSN/GHN Model Number



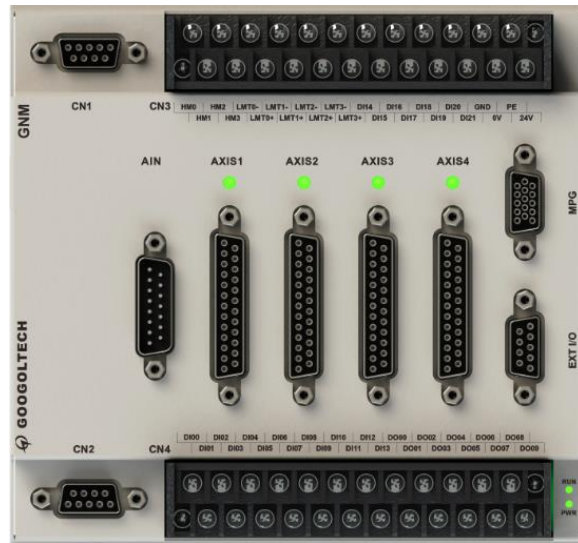
GTN	GSN	GHN
GTN-016-G-00	GSN-024-G-00	GHN-024-G-00
GTN-016-V-00	GSN-024-GT-00	GHN-024-V-00
GTN-024-G-00	GSN-024-V-00	GHN-048-G-00
GTN-024-V-00	GSN-024-VT-00	GHN-048-V-00
	GSN-048-G-00	
	GSN-048-GT-00	

GTN/GSN/GHN Function Features

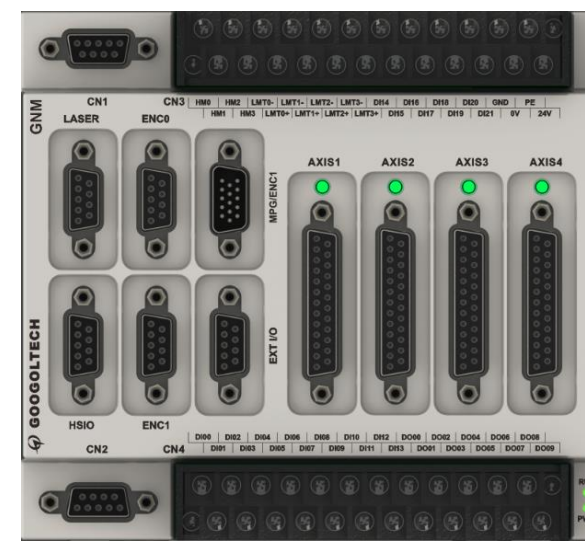


	Laser	Galvo scanner	Pulse	Closed-loop	Gantry	5-axis	Robot
G	●	●	●	○	○	○	○
GT	●	●	●	○	○	●	●
V	●	●	●	●	○	○	○
VT	●	●	●	●	●	●	●

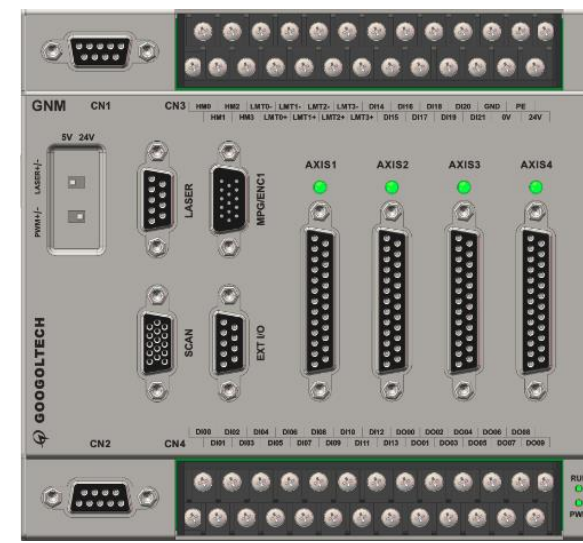
GNM Ring Net Axis Module



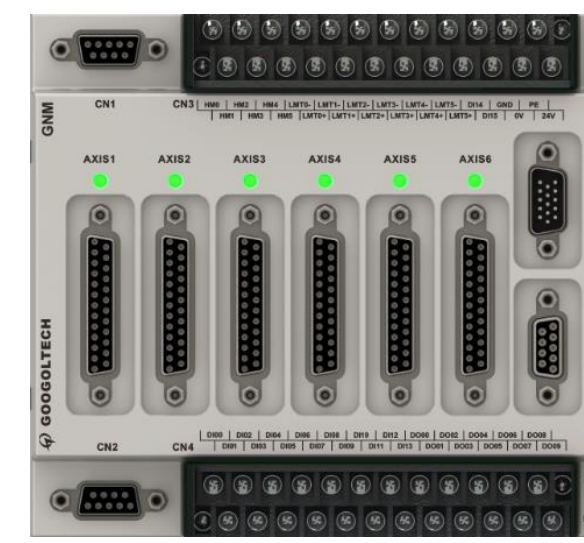
GNM-401



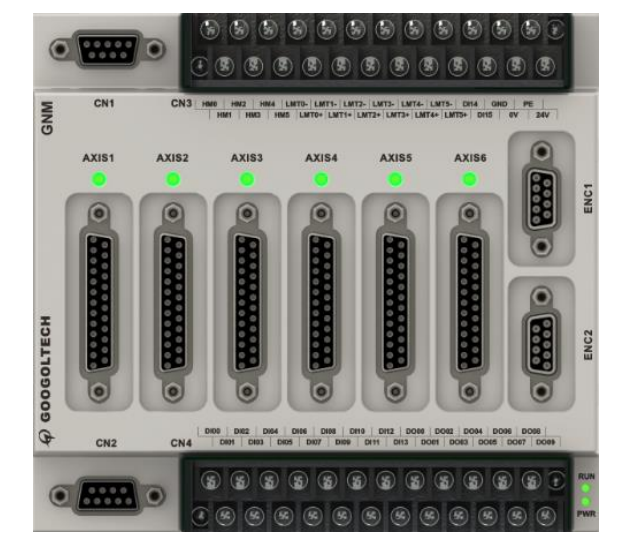
GNM-402



GNM-403



GNM-601



GNM-602

GNM	Type	No. of axis	DI	DO	MPG	Auxiliary encoder	Laser	Galvo scanner	Position comparison output	DA	AD	EX I/O
401	PV	4	22	10	1	-	-	-	2	4	8	1
402	PG	4	22	10	1	2	1	-	2	-	-	1
403	Laser / galvo scanner	4	22	10	1	-	1	1	2	6	-	1
601	PG	6	16	10	1	-	-	-	2	-	-	1
602	PG	6	16	10	-	2	-	-	2	-	-	-

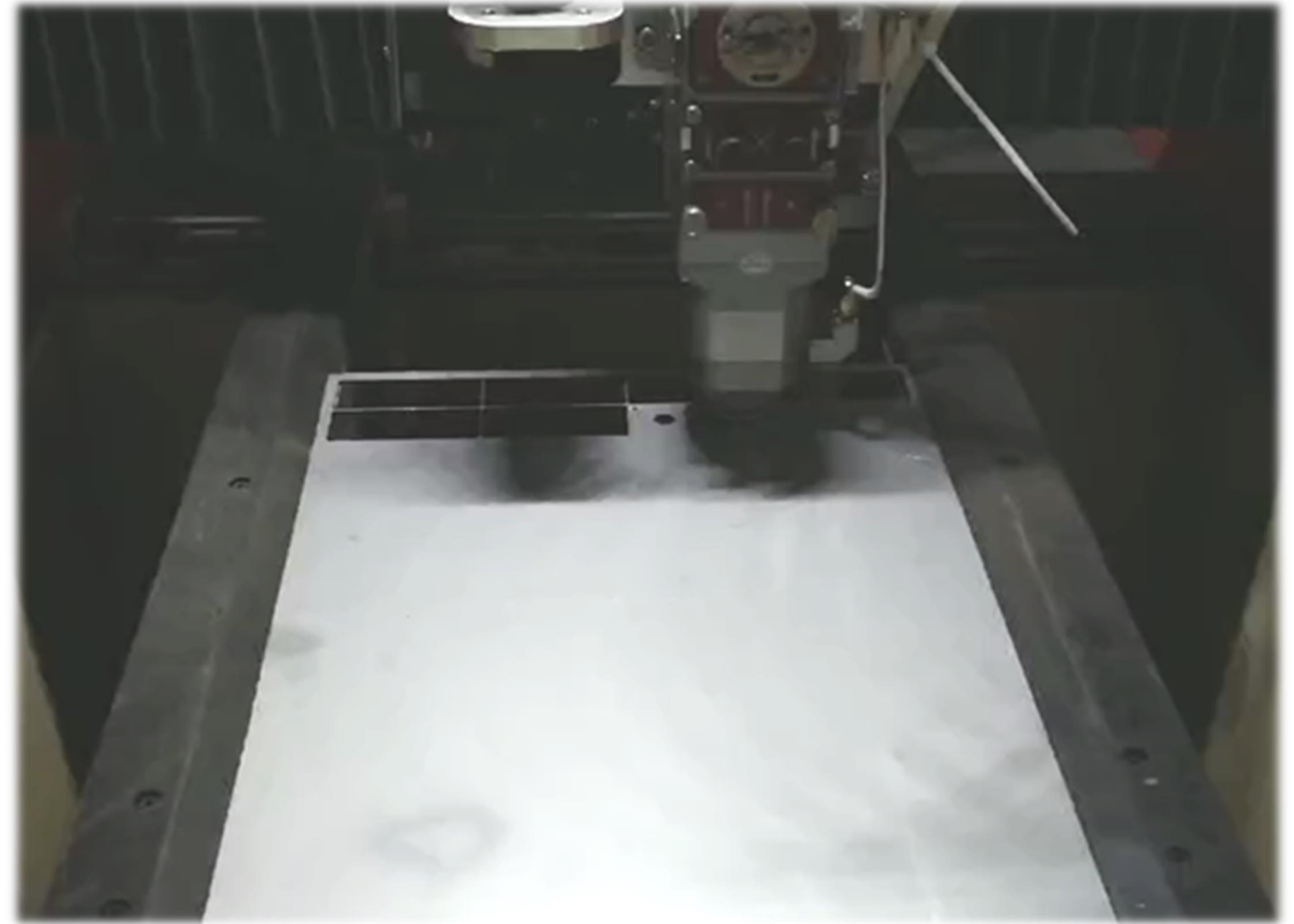
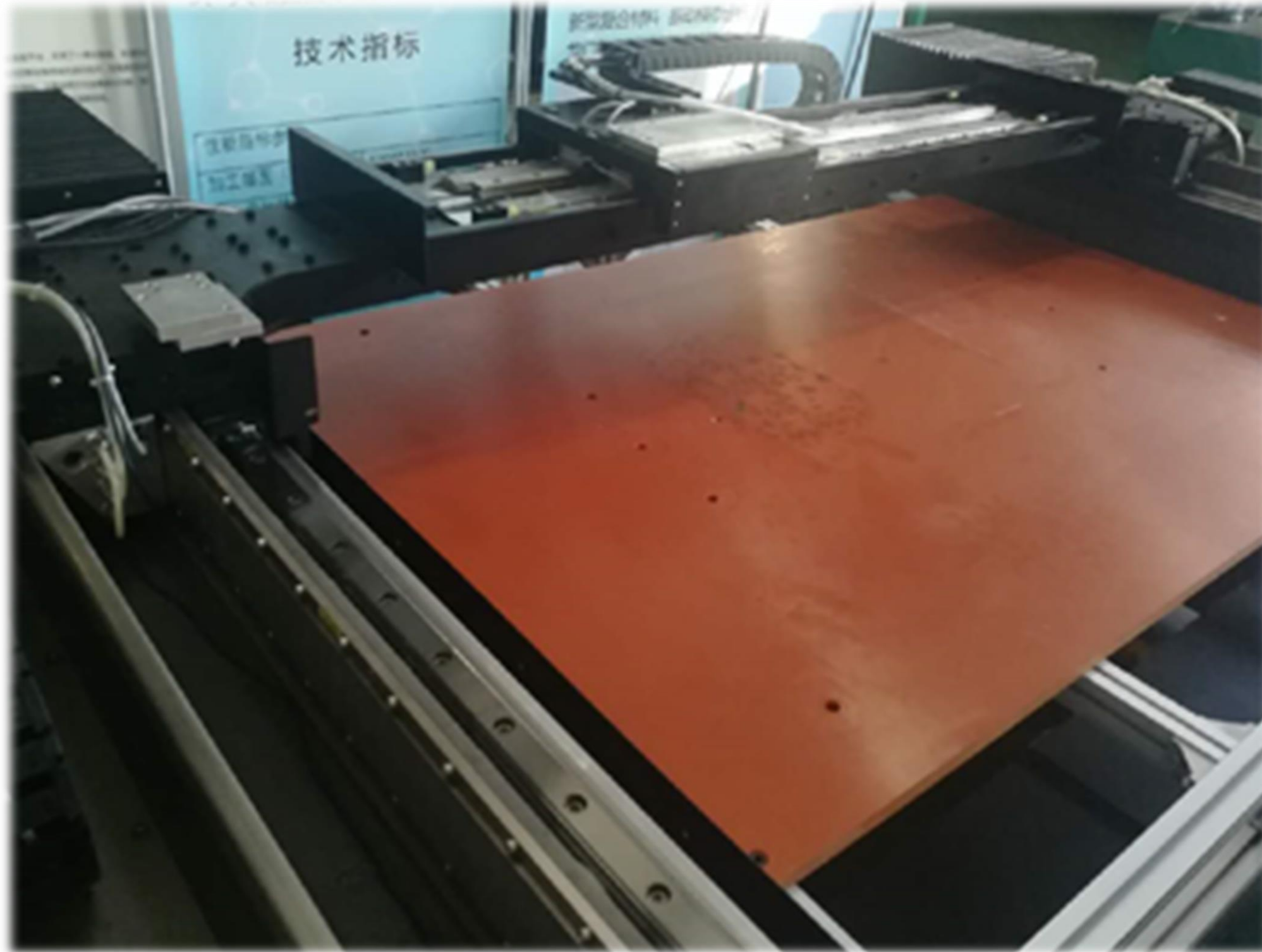
Network Control Card Technical Features



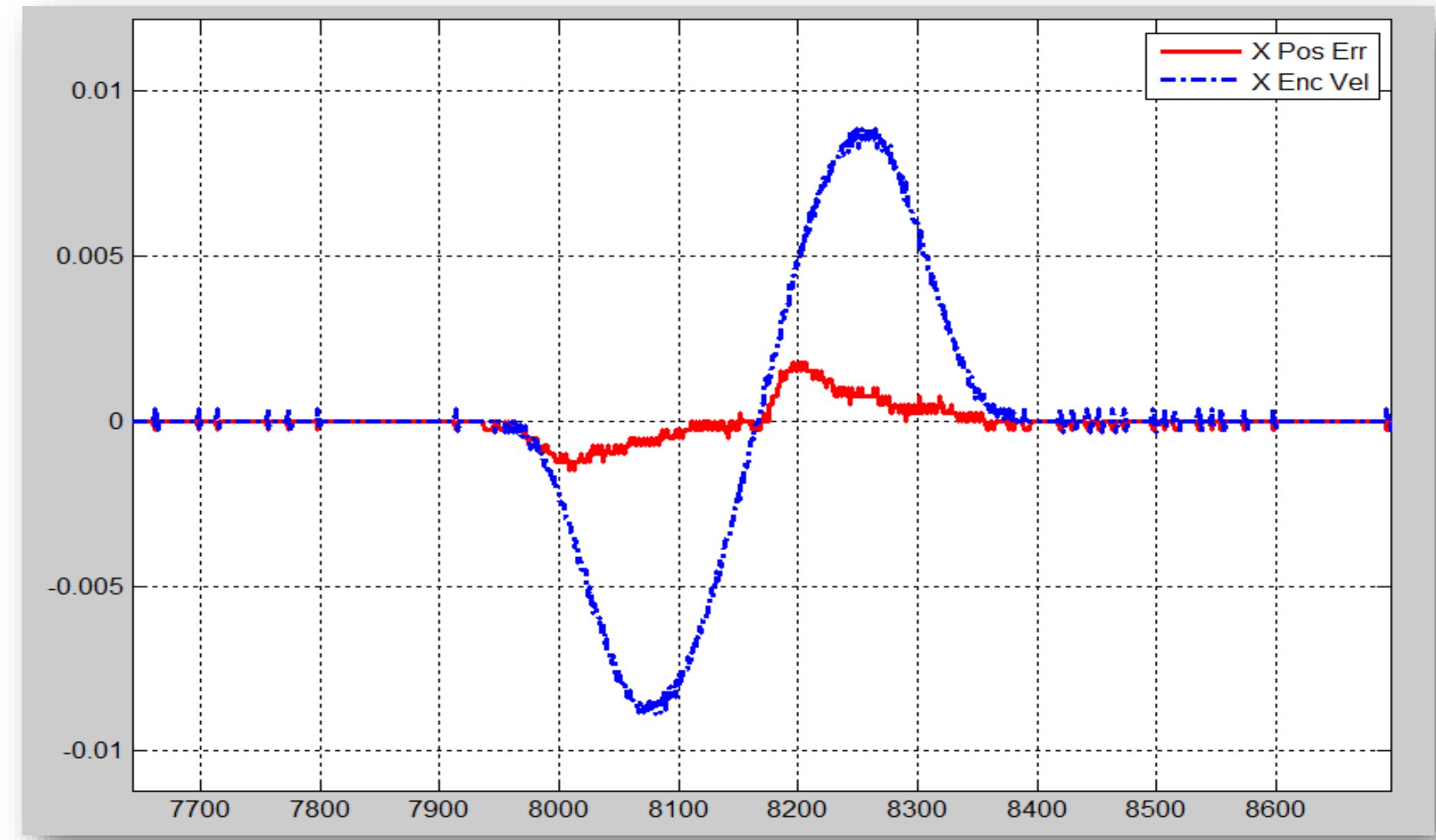
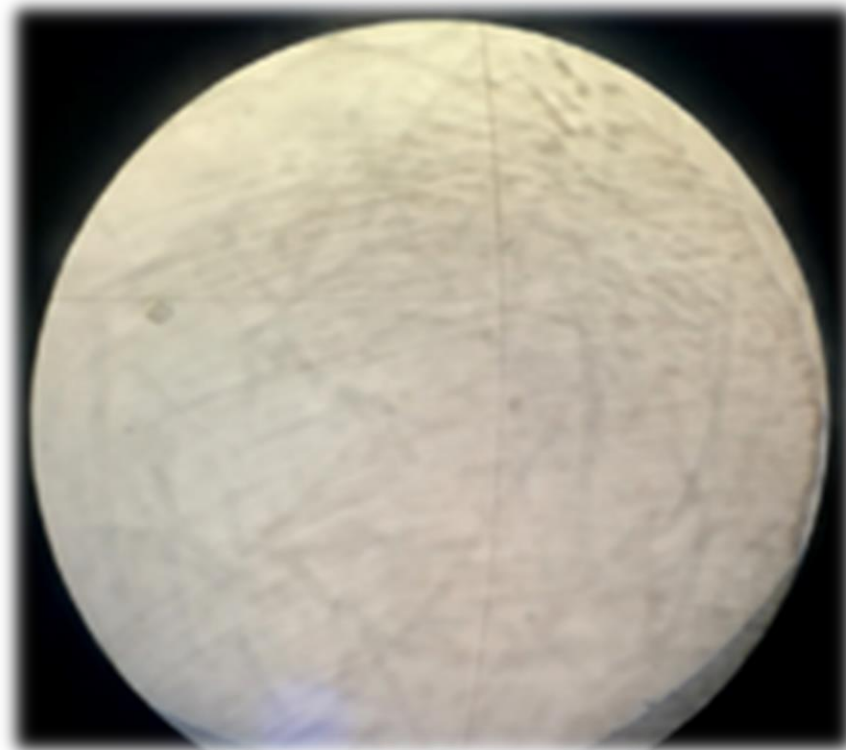
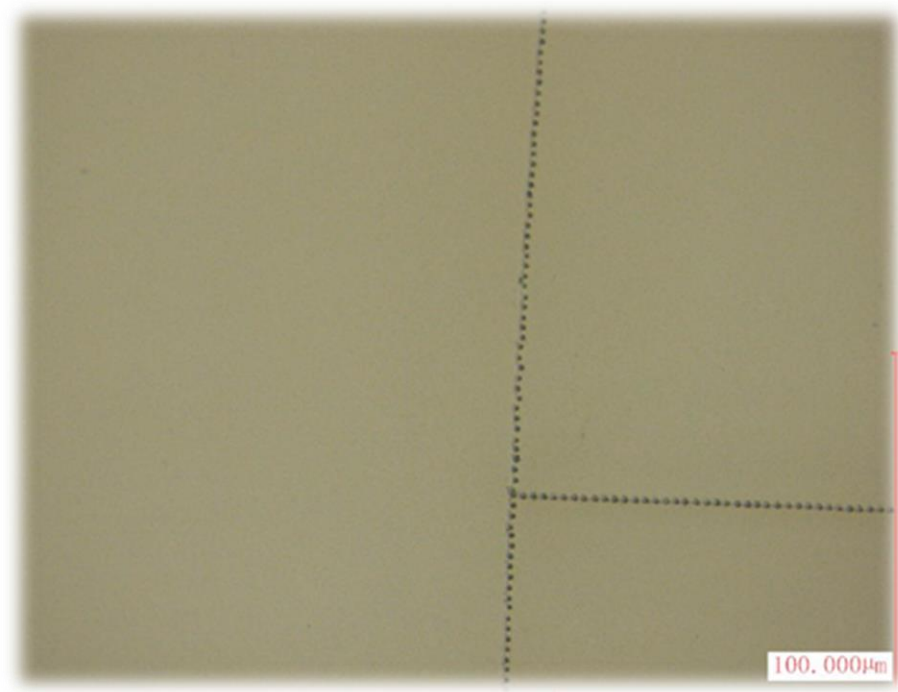
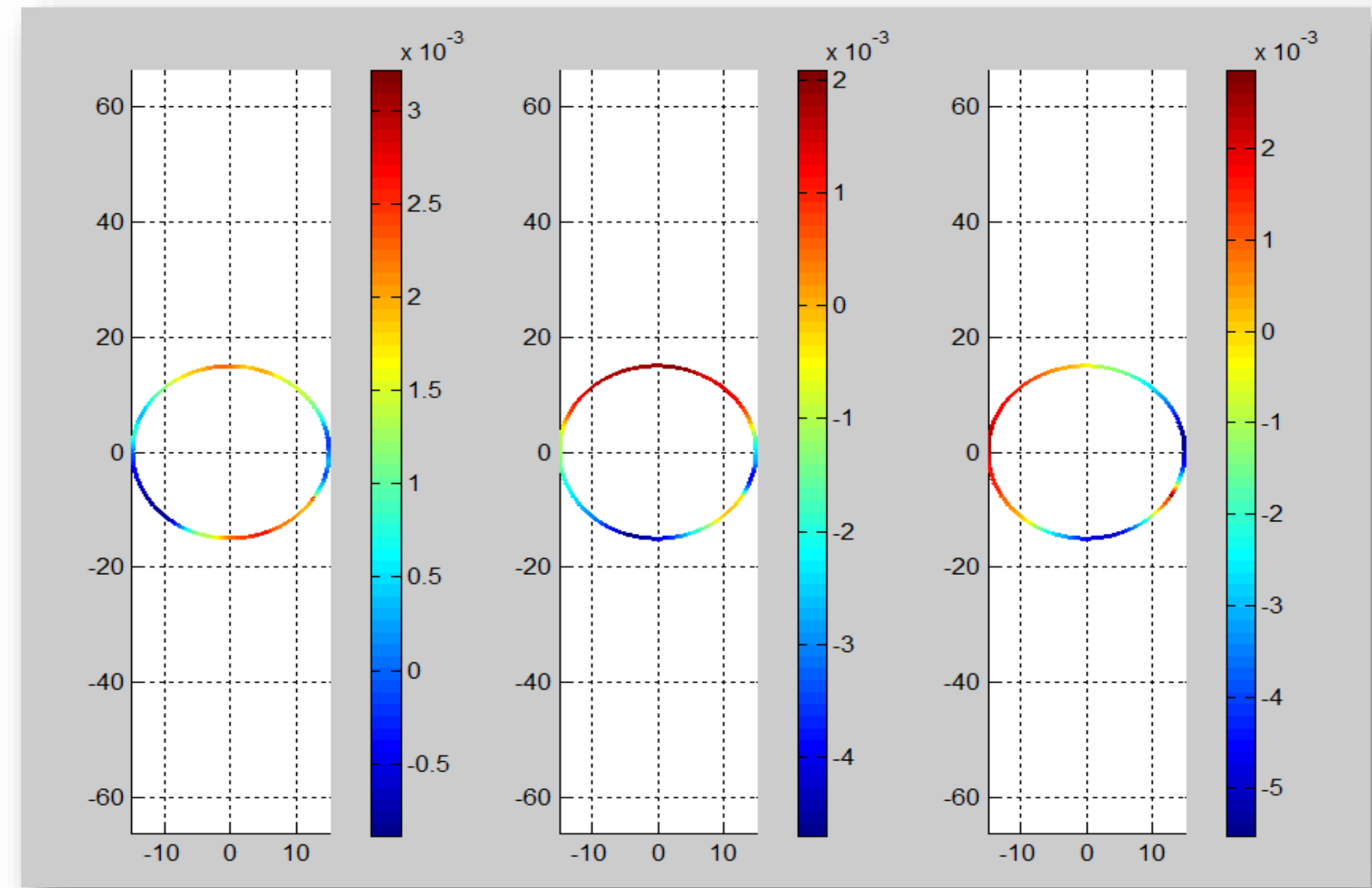
Product series	GTN-016			GTN-024	GHN-024	GSN-024			GSN-048		
Control cycle	250μs			500μs	250μs	250μs			500μs		
Maximum no. of controlled axis	16			24					48		
Maximum number of connected GNM module	4			6					12*		
Digital input	88	22 ch.	4 modules	132			22 ch.	6 modules	264	22 ch.	12 modules
Digital output	40	10 ch.	4 modules	60			10 ch.	6 modules	120	10 ch.	12 modules
Non-axis analog input	32	8 ch.	4 modules	48			8 ch.	6 modules	96	8 ch.	12 modules
Axis analog output	16	4 ch.	4 modules	24			4 ch.	6 modules	48	4 ch.	12 modules
Non-axis analog output	8	2 ch.	4 modules	12			2 ch.	6 modules	24	2 ch.	12 modules
Auxiliary encoder + MPG	12	3 ch.	4 modules	18			3 ch.	6 modules	36	3 ch.	12 modules
MPG interface DI	28	7 ch.	4 modules	42			7 ch.	6 modules	84	7 ch.	12 modules
Encoder latch	16	4 ch.	4 modules	24			4 ch.	6 modules	48	4 ch.	12 modules
Position comparison output	8	2 ch.	4 modules	12			2 ch.	6 modules	24	2 ch.	12 modules
Maximum number of connected gLink extension IO module	64	30	1 module	64			30	1 module	64	30	1 module
Laser	2	1 ch.	2 modules(core 1)	3			1 ch.	3 modules (core 1)	6	1 ch.	6 modules (core 1)
Galvo scanner	2	1 ch.	2 modules(core 1)	3			1 ch.	3 modules (core 1)	6	1 ch.	6 modules (core 1)
Interpolation coordinate system	4	2	2 cores	4			2	2 cores	4	2	2 cores

12*: currently support up to 8 GNM modules; ch.: channel

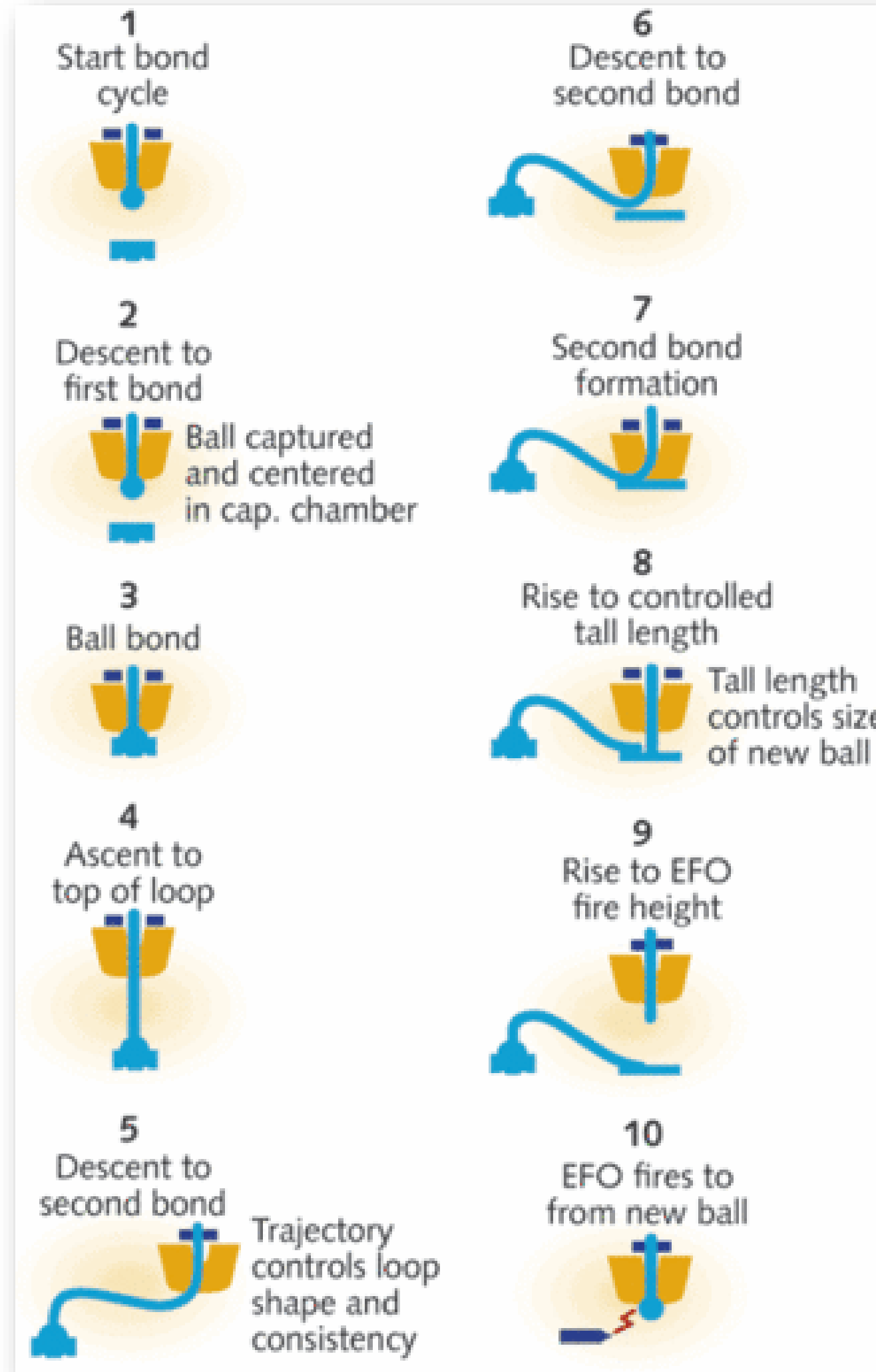
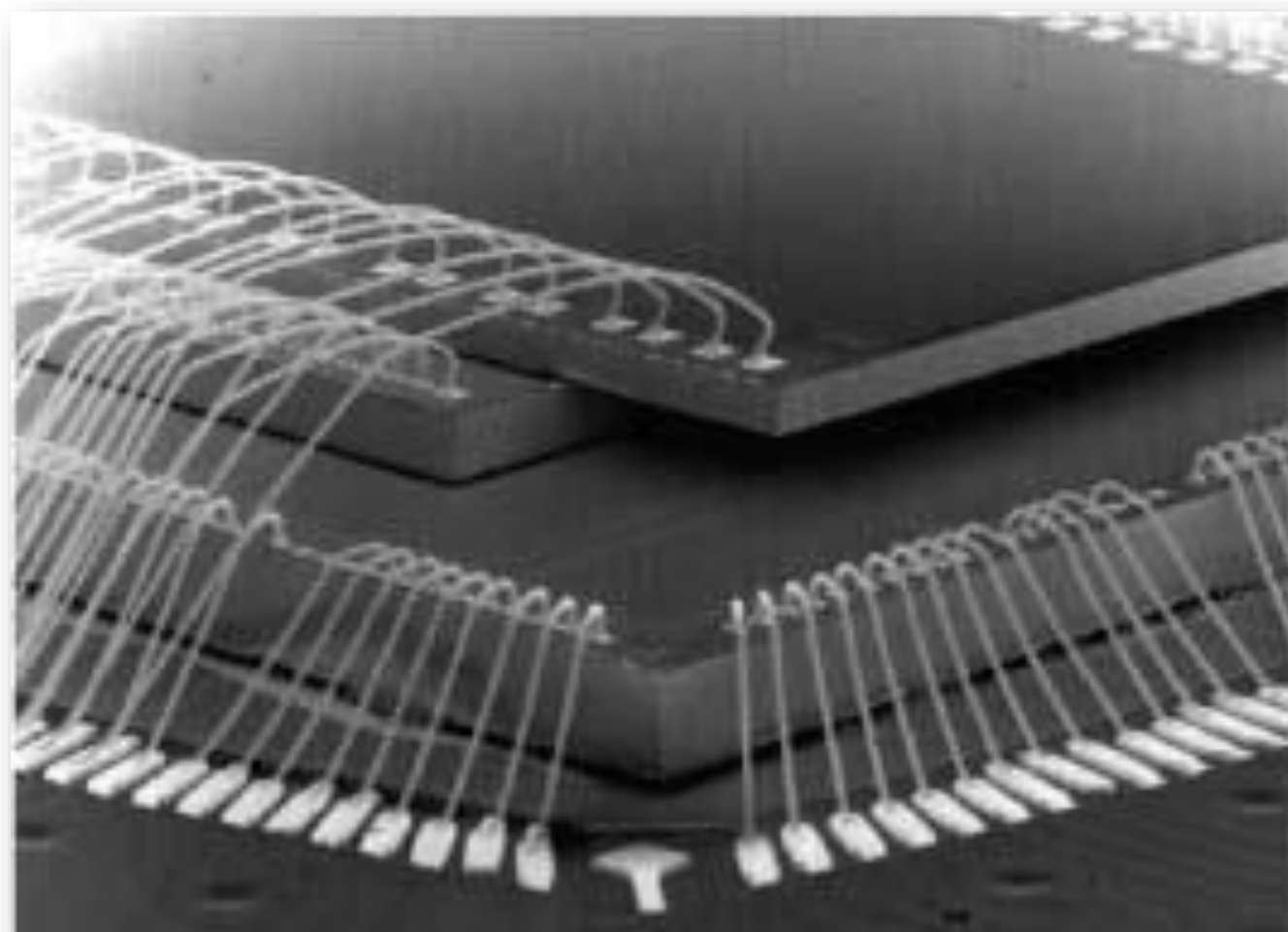
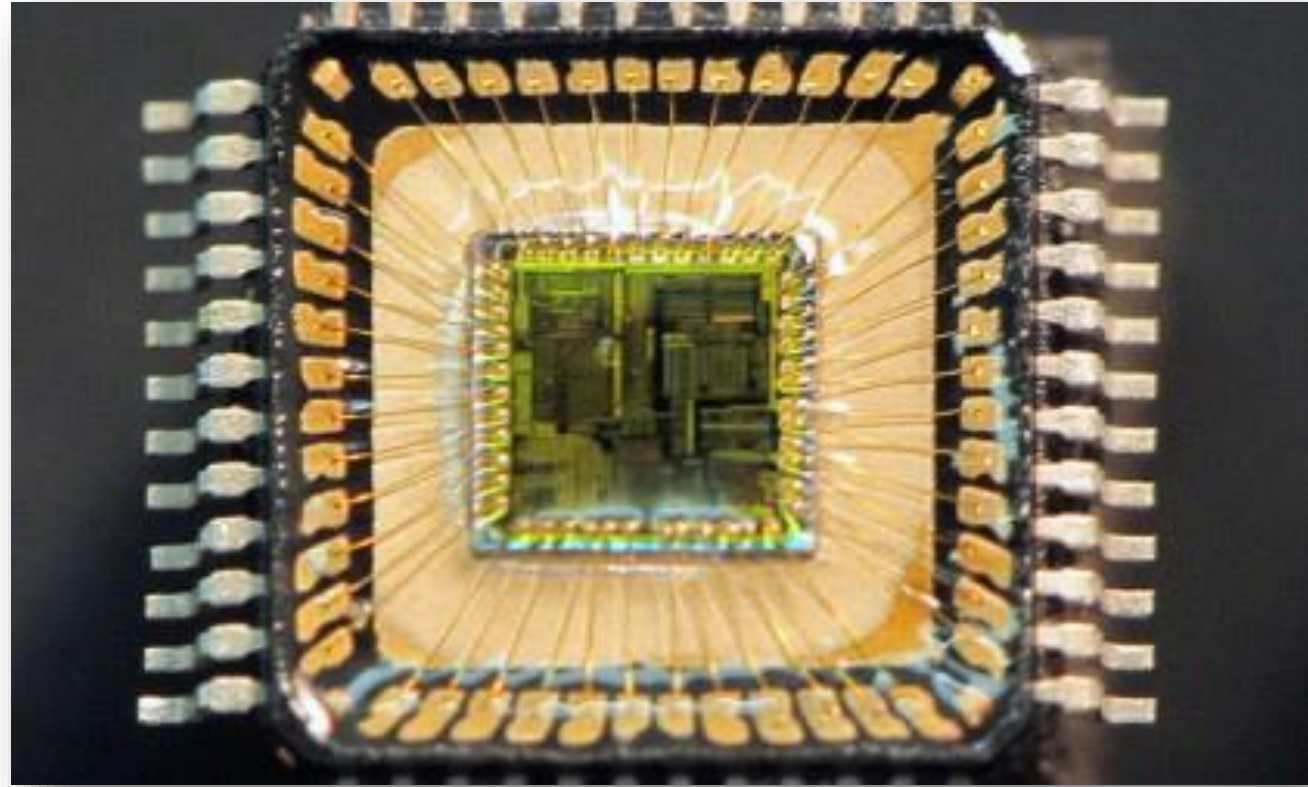
GSN Application Case: High Speed Gantry Control System



GSN Application Case: Laser Precise Cutting Control System

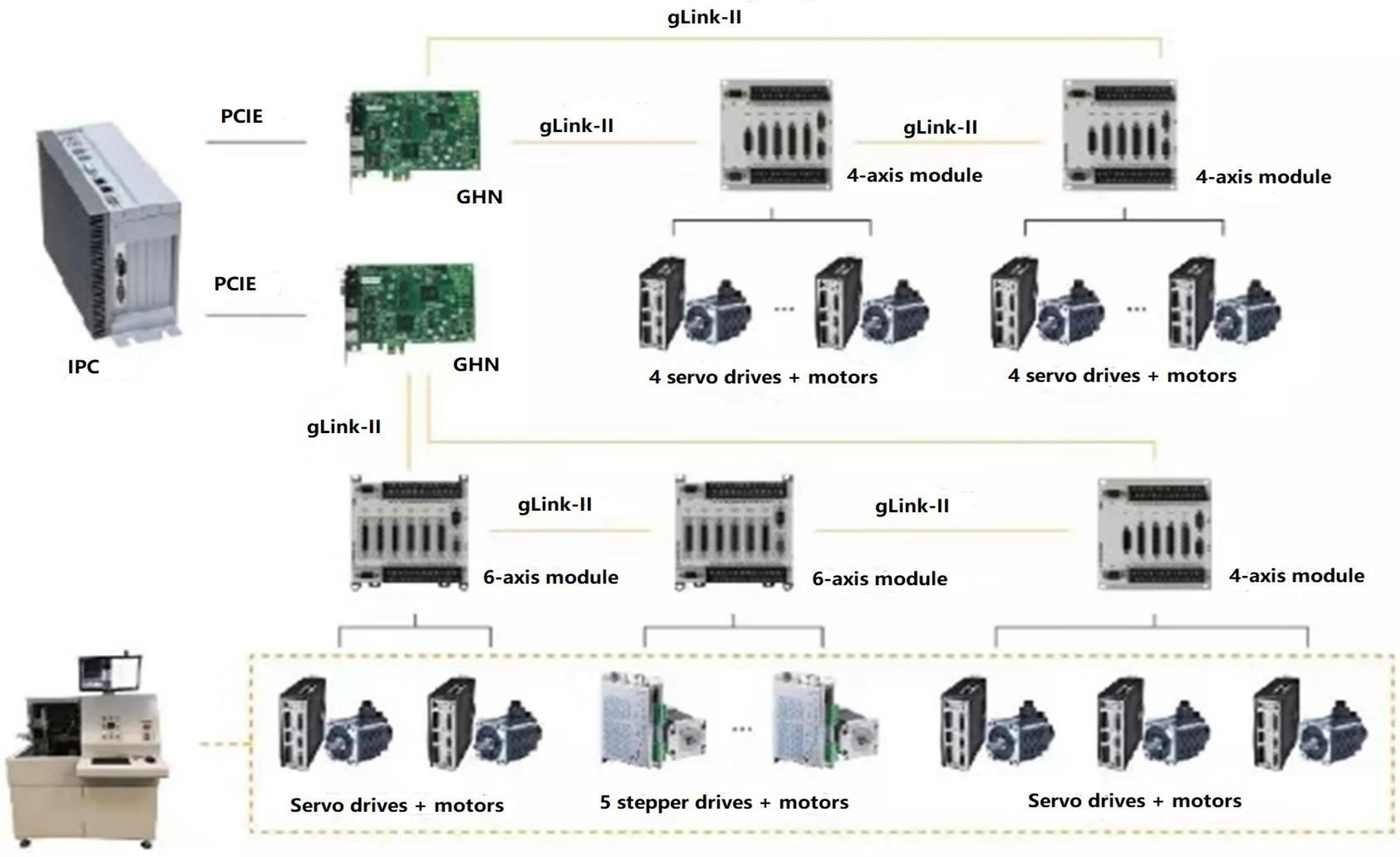


GHN Application Case: Wire Bonder Control System 固高科技



Specification	Parameter	Unit
Number of controlled axis	20	axis
X/Y axis acceleration	15	G
Z-axis (bond head) acceleration	120	G
X/Y axis grating ruler resolution	50	nm
Z axis grating ruler resolution	100	nm
PR precision	0.3	μm
Golden wire diameter	12.5~30	μm
Bonding speed	20	wires/sec
Bonding precision	2	μm

GHN Application Case: Semiconductor Industry



- GTN/GSN/GHN network master cards only support gLink-I extension modules
 - ✓ Each GNM module can connect up to 30 gLink-I extension modules;
 - ✓ Each master card (any model of GTN/GSN/GHN series) can connect up to 64 gLink-I extension modules;
 - ✓ Comparison of gLink-I modules and 200 Protocol modules:
 - Fast refresh speed: gLink-I refresh cycle 1ms · 200 Protocol ones need 30ms ;
 - Facilitate distributed networking: gLink-I extension module can access to any gLink-II slave stations.
- Master card of different series cannot be mixed to use;
- Firmware of master card and GNM module of various model cannot be mixed to burn;
- If the number of connected GNM modules exceeds the defined maximum value of the master card (unit in cores) specification, there will be error prompt when opening the card;
- If the number of connected axes exceeds the maximum value of the master card (unit in cores) specification, the exceeded part cannot be controlled;
- Maximum length of single gLink-I / gLink-II communication cable: 50m

Thank you!