

Precision Timing in Computer Numerical Control (CNC)

CNC machines manufacture parts by cutting and shaping sections from hard materials such as plastics, metals, and wood. Automated motion control machines, like CNC, have three primary components: a command function, a drive/motion system, and a feedback system.

Precision is fundamental to CNC to ensure tight tolerance when manufacturing piece parts. The need for precision extends to the need for precise and resilient timing sources.

Key Considerations

- Precision clock source
- Wide temp range
- EMI resilience
- Temp stability

SiTime MEMS solutions provide timing for CNC equipment in two areas: the programmable logic controller (PLC) and the equipment control panel.

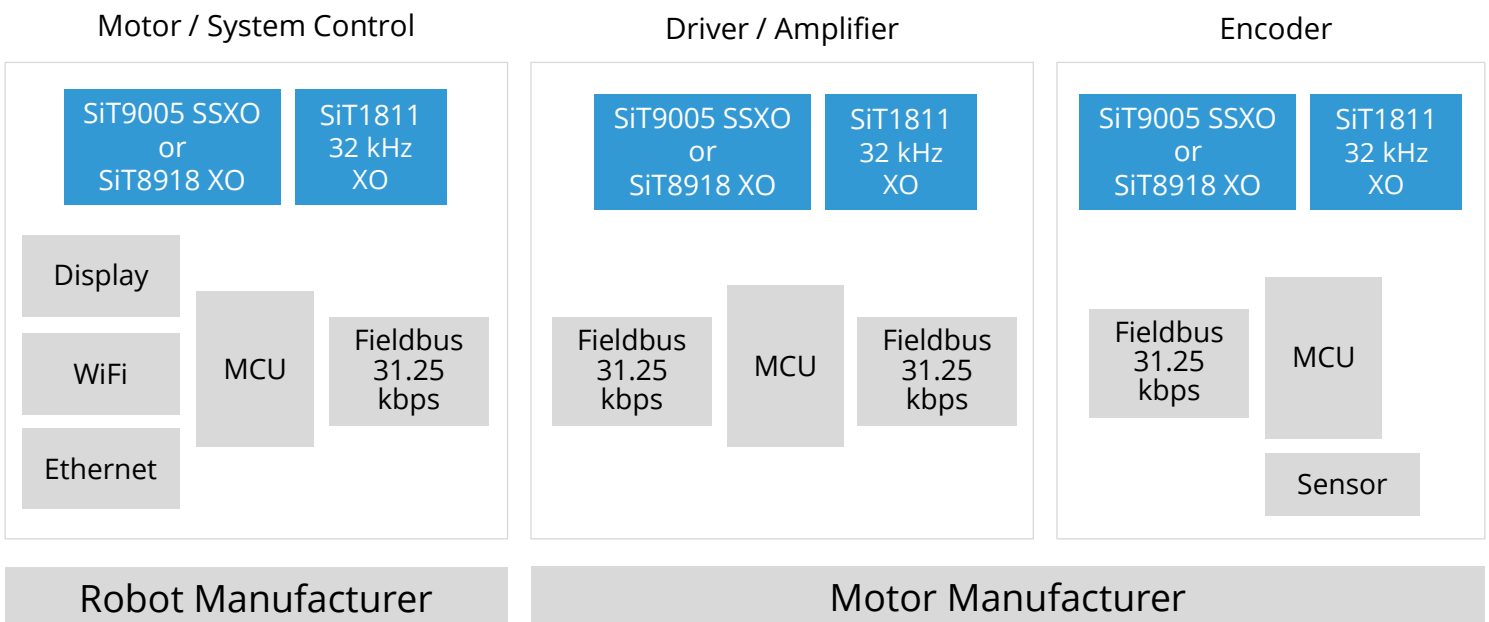
Clocking is needed in PLCs to control material and cutting head positioning:

- Timing for CPU
- Memory interface
- Ethernet communication

Clocking is needed in the equipment control panel (main user interface) used to program and control the CNC machine. There are additional timing requirements for the motherboard and associated circuitry:

- Timing for MCU
- Interface to the display
- Ethernet / fieldbus interface

Block Diagrams for Programmable Logic Controller and CNC/ Equipment Control



Featured products – please refer to [Sitime.com](https://www.sitime.com) for more options

Type	Product	Frequency	Key Features	Key Values
MHz Oscillator	SiT8918	1 to 110 MHz	<ul style="list-style-type: none"> -40°C to +125°C ±20, ±25, ±50 ppm stability 1.3 ps RMS jitter¹ 2016, 2520, 3225, 5032, 7050 packages 	<ul style="list-style-type: none"> High reliability Extended temperature range EMI reduction features Small footprint Low power Resilient to electromagnetic Interference, ideal for high-current environments
	SiT1615	10 standard frequencies: 8, 10, 12, 16, 24, 25, 27, 32, 48, 50 MHz	<ul style="list-style-type: none"> -40°C to +125°C ±25, ±30, ±50 ppm stability 1612, 2016, 2520, 3225 packages 500 fs RMS jitter¹ 2.3 mA typ. current consumption 	
	SiT8920	1 to 110 MHz	<ul style="list-style-type: none"> -55°C to 125°C operating temperature 2.0 x 1.6 mm 	
Spread Spectrum Oscillator	SiT9005	1 to 141 MHz	<ul style="list-style-type: none"> -40°C to +85°C operating temperature Spread spectrum 	<ul style="list-style-type: none"> System EMI reduction up to 17 dB High reliability Resilient to electromagnetic Interference, ideal for high-current environments

¹ 12 kHz to 20 MHz integration range

Why SiTime Timing Solutions

More robust in harsh environments

- 4x better vibration resistance — 0.1 ppb/g typical
- 20x better shock survivability

Better stability over a wide temperature range

- Up to -55 to +125°C operation
- Airflow and thermal shock resistant — 1 ppb/°C

Programmability for flexible design

- Any frequency, any stability, any voltage within a wide range
- Qualify once for multiple parts

High reliability

- 50x better quality and reliability — over 2.2 billion-hour MTBF
- Lifetime warranty

Unique features

- EMI reduction features — up to 30 dB lower emissions
- Low power oscillators — down to 490nA typical (SiT1811 32.768 kHz oscillator)
- Smaller size — down to 1.5 mm x 0.8 mm packages



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