SIL2/SIL3 & Robot Control Platform

Industrial robots with collaborative applications are becoming a critical asset to the manufacturing sector. The requirements of collaborative applications for industrial robot is to reach safety performance level up to SIL2 according to IEC 61508, or Cat.3 PL=d according to ISO 13849-1.
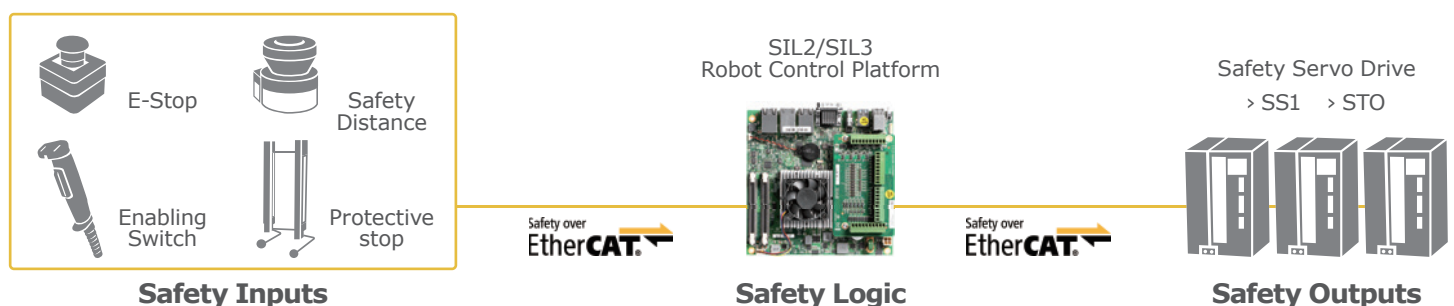
To develop collaborative applications, NexCOBOT provide SIL2/SIL3 robot control platform and shorten the overall development life cycle for customers to build functional safety collaborative applications for industrial robot.

The SIL2/SIL3 robot control platform is include a SIL2 hardware platform SCB100, which is provided various safety interfaces for user to use in their own safety application. Also, user could use the SIL 3 software building blocks of SIL2/SIL3 robot control platform to focus on developing their own safety software applications.
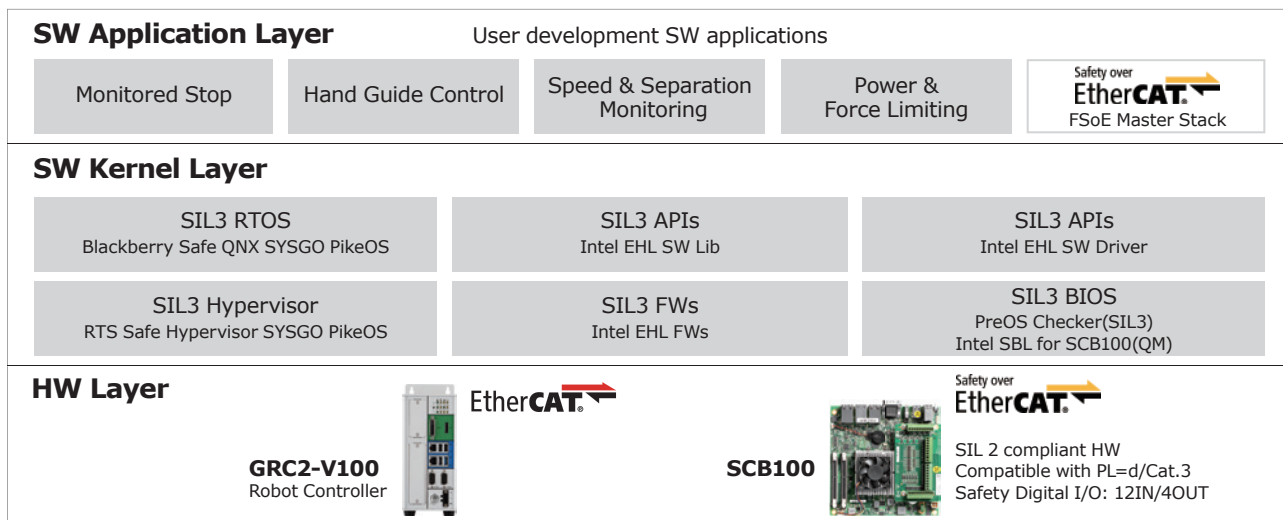
Features

- **Functional Safety Certified Platform**
  - Pre-Cert. by TÜV Rheinland
  - HW safety level up to SIL 2, Cat.3 PLd
  - SW safety level up to SIL3

- **Comprehensive Safety Interfaces**
  - Safety digital I/O: 12IN/4OUT
  - Integrated EtherCAT slave for FSoE application
  - 4 x GbE for safety communication application
  - On board EMMC 64GB for safe data storage

- **Fast Time to Market for Safety Applications**
  - Pre-Cert. SIL2 HW platform: SCB100
  - Pre-Cert. SIL3 SW build blocks
  - Safety documentation-ready: Safety Manual, FMEDA

- **Focus on Safety Applications**
  - Supported Safe Hypervisor: RTS, SYSGO
  - Supported Safe RTOS: QNX, SYSGO
  - Provide APIs to detect HW platform failures
  - Provide APIs to do SW cross check mechanism
  - Provide Safe I/O example code
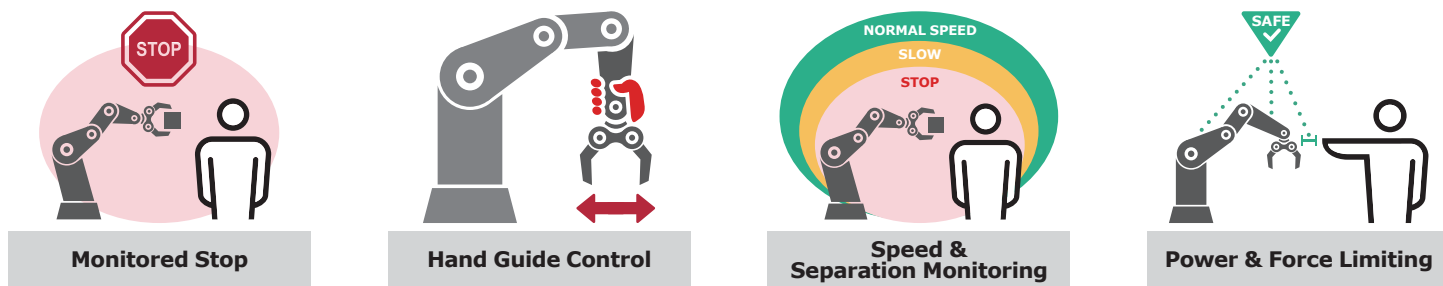 - Provide EtherCAT slave stack example code

System Architecture

Safety Inputs: E-Stop, Safety Distance, Enabling Switch, Protective stop

Safety Logic: SIL2/SIL3 Robot Control Platform — Safety over EtherCAT

Safety Outputs: Safety Servo Drive › SS1 › STO

Integrated Solution Building Blocks

SW Application Layer — User development SW applications

Monitored Stop	Hand Guide Control	Speed & Separation Monitoring	Power & Force Limiting	Safety over **EtherCAT.** FSoE Master Stack

SW Kernel Layer

SIL3 RTOS Blackberry Safe QNX SYSGO PikeOS	SIL3 APIs Intel EHL SW Lib	SIL3 APIs Intel EHL SW Driver
SIL3 Hypervisor RTS Safe Hypervisor SYSGO PikeOS	SIL3 FWs Intel EHL FWs	SIL3 BIOS PreOS Checker(SIL3) Intel SBL for SCB100(QM)

HW Layer

EtherCAT.

GRC2-V100 Robot Controller

Safety over **EtherCAT.**

SCB100

SIL 2 compliant HW
Compatible with PL=d/Cat.3
Safety Digital I/O: 12IN/4OUT

User Scenario

Monitored Stop

Hand Guide Control

NORMAL SPEED
SLOW
STOP

Speed & Separation Monitoring

SAFE

Power & Force Limiting

Specification

Model		Item		Specification
Software	FW	Intel Elkhart Lake FWs		SIL 3, Pre-loaded to SCB100
	BIOS	Intel Slim Bootloader		Modified version for SCB100, Pre-loaded to SCB100
		Intel PreOS Checker		SIL 3, Pre-loaded to SCB100
	APIs	Intel Elkhart Lake Safety APIs		SIL 3, Source Code available(*)
	Examples	Quality Management (QM) source code, EtherCAT slave software stack source code		
Hardware	SCB100	CPU	Safety Related	Intel Atom® x6427FE, 4 Cores 1.9GHz
		RAM	Safety Related	2x DDR4 SO-DIMM, support up to 32GB
		Storage	Safety Related	On board 64GB EMMC
			-	SATA Interface
		Mini-PCIe	Black Channel	1 x miniPCIe
		COM Port	Black Channel	2 x RS232/422/485 with Auto flow control
		EtherCAT	Black Channel	1 x EtherCAT slave (2 x RJ45 Ports)
		Ethernet	Black Channelt	1 x I225 GbE LAN, 3 x GbE LAN
		Digital Inputs	Safety Related	12 inputs, 24 VDC SELV/PELV, 2~15mA, H: 11-30VDC, L: 0-5VDC
		Digital Outputs	Safety Related	4 inputs, 24 VDC SELV/PELV, 0.5A of each channel, 2A of total DO channel ON: output voltage > 18VDC, OFF: output voltage < 3VDC
		Power	Safety Related	AT/ATX mode (by jumper setting default-AT) 24V -15% ~ +20%, acc. to IEC 61131-2, 4-pin power connector for DC input
		USB	-	2 x USB 3.0, 4 x USB 2.0
		Display	-	1 x HDMI
		Dimension		Mini-ITX (17cm x 17cm)
		Environment		Operating: -20~60°C, Storage: -40~85°C, Relative Humidity: 90%
		Vibration, Shock, EMC Certifications		IEC 61131-2, IEC 61326-3-1, IEC 61131-2
Documents		SCB100 Safety Manual, SCB100 Failure Mode and Effects Analysis (FMEDA) Report		

* Note: Need to have NDA with Intel to download source code

Ordering Information

♦ **SCB100 (P/N: 10Q00010003X1)**
  - NexCOBOT RRC FuSa Board