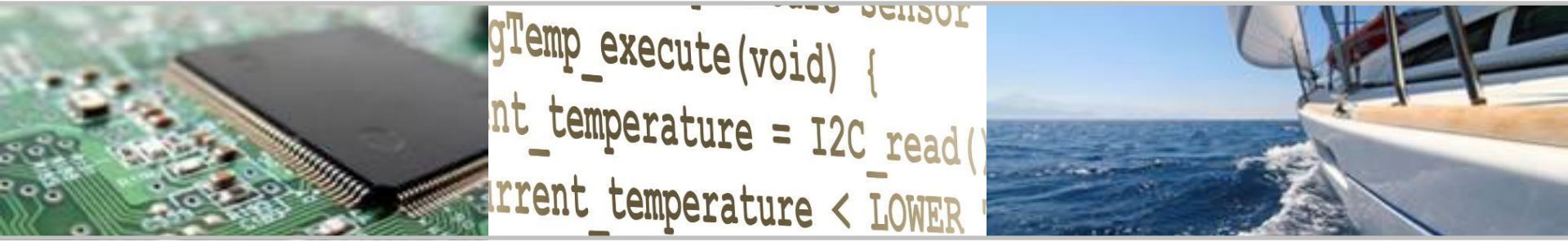
SAFETY DESIGN PACKAGES

SAFE DRIVE MONITOR 1oo2 Core



… where ideas turn into success!

THE COMPANY

…where ideas turn into success!

MESCO is your partner for innovative software and hardware development in the field of process and factory automation.

We have a unique and comprehensive knowledge in the areas of industrial communication, functional safety and explosion protection.

Benefit from our many years of expert knowledge and our expertise in the development of customer-specific solutions from concept to approval.

OUR RANGE OF SERVICES

Factory Automation & Process Automation

Tailor-made Development Solutions

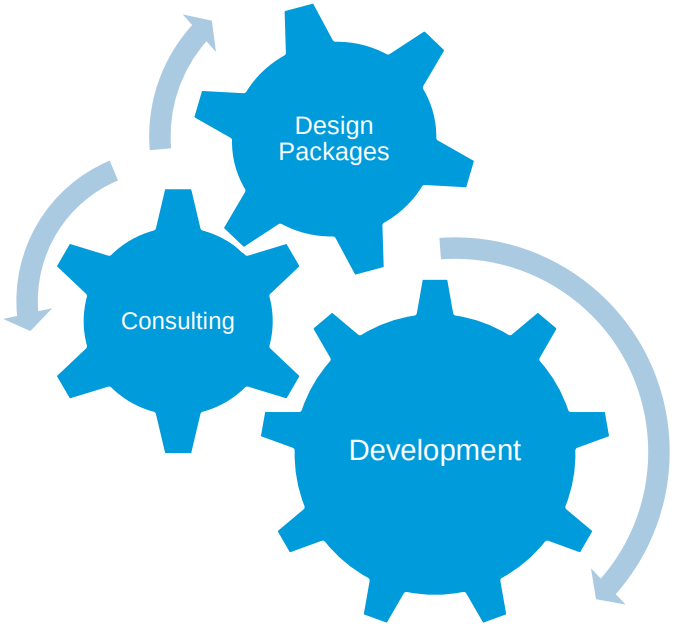
Customized hardware and software development with flexible use of design packages.

Directly applicable Design Packages

Proven circuits and software components for rapid implementation of your development project.

Development Consulting

Development accompanying consulting and coaching in the areas of functional safety,
explosion-proof and industrial communication.



OUR OFFERING

Your success is our driving force

Consulting

- Technology Consulting
- Functional Safety Management
- Explosion-proof trainings
- Industrial Communication
- Support in the creation of Requirements

Concept – Architecture

- Creation of the Functional Safety Concept
- Creation of the Explosion-proof Concept
- System Architecture
- Quality Assurance Measures

Development – Design / Implementation / Prototyping

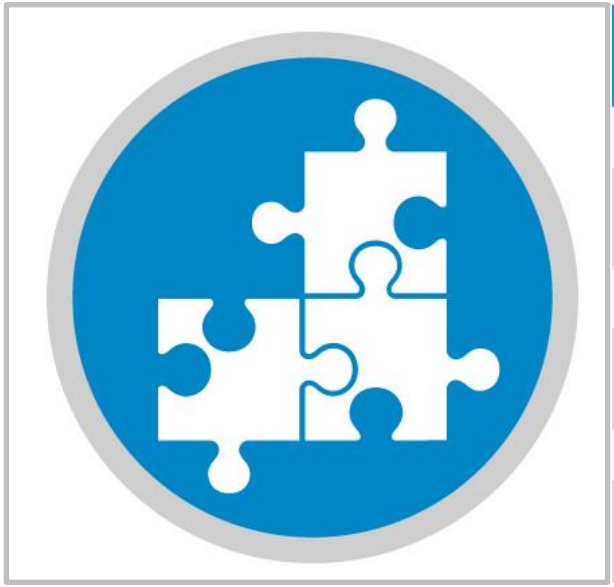
- Hardware Development
- Software Development
- Safety Development
- PCB Layout
- Prototyping
- Type Testing
- Integration Test
- Use of existing Safety Design Packages
- Support of product launching into production

Certification

- Comprehensive Support of the Certification

MESCO SAFETY DESIGN PACKAGES

Overview



Basic Architecture of Safety Electronics

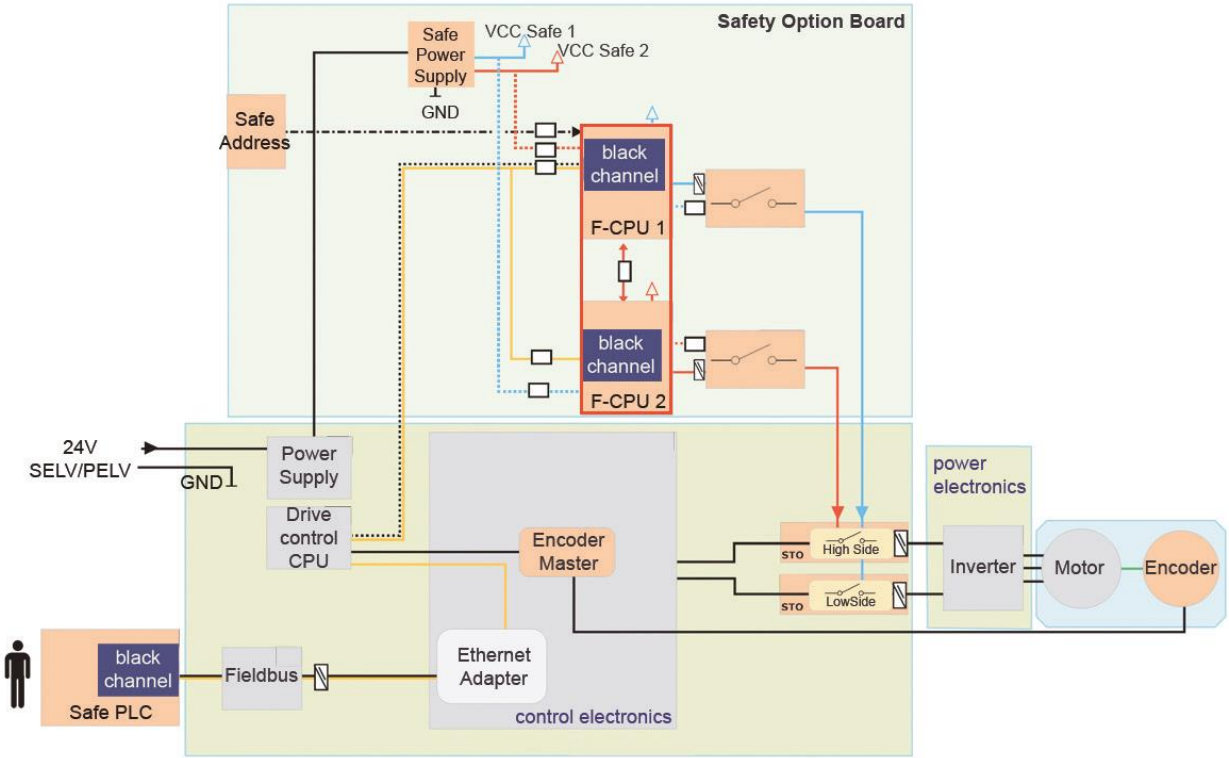
MESCO Safety Design Packages: Description

MESCO Safe Drive Monitor 1oo2 Core

MESCO Design Packages: Benefit

USE CASE: SAFE DRIVE APPLICATION

Block diagram



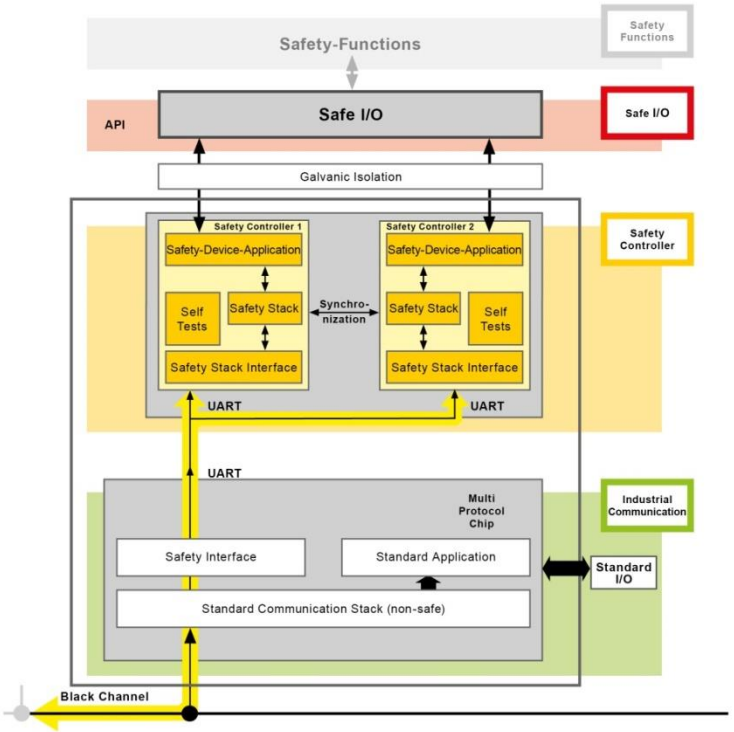
ARCHITECTURE OF SAFETY ELECTRONICS

Industrial Ethernet, Safe Drive Monitor, Safe I/O

- Safe inputs and outputs
- Safe serial interfaces

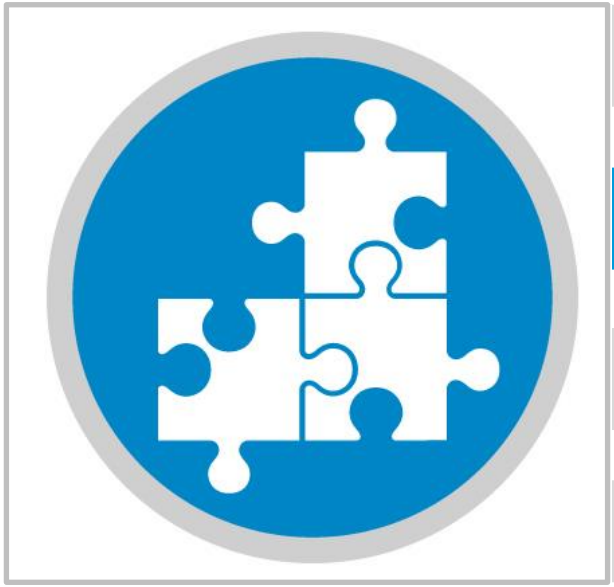
- Packing and unpacking of safe data
- Implementation of safe communication profiles
- Safe Drive Monitor 1oo2 Core architecture with synchronizing
- Activation of safety functions

- Separation safe / non-safe communication packets
- Industrial communication with EtherCAT + safe communication with FSoE (black channel)



MESCO SAFETY DESIGN PACKAGES

Overview



Basic Architecture of Safety Electronics

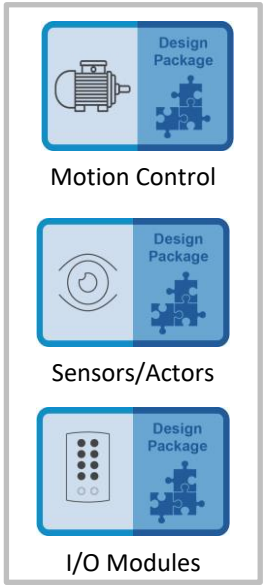
MESCO Safety Design Package: Description

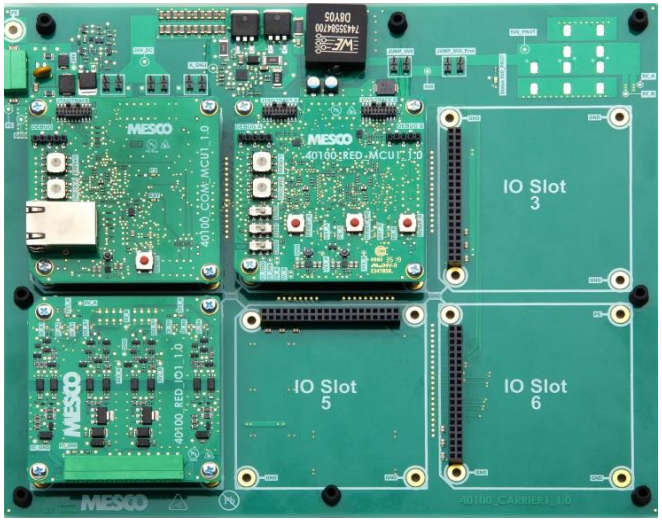
MESCO Safe Drive Monitor 1oo2 Core

MESCO Design Packages: Benefit

MESCO SAFETY DESIGN PACKAGES

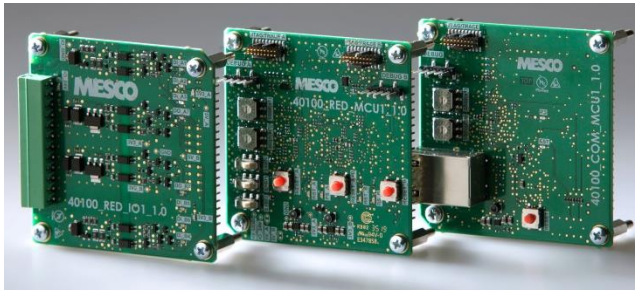
Build-up with a base board & expansion boards





Base board with universal slots

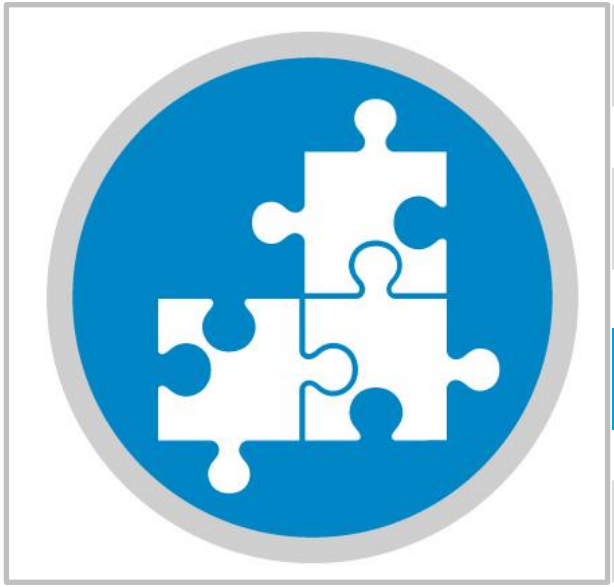
- Built up with a base board & expansion boards as a reference design, our Design Packages simplify and accelerate the development in both safety- and non-safety-related environments.



Expansion boards

MESCO SAFETY DESIGN PACKAGES

Overview



Basic Architecture of Safety Electronics

MESCO Safety Design Package: Description

MESCO Safe Drive Monitor 1oo2 Core

MESCO Design Packages: Benefit

DRIVE CUSTOMER REQUIREMENTS

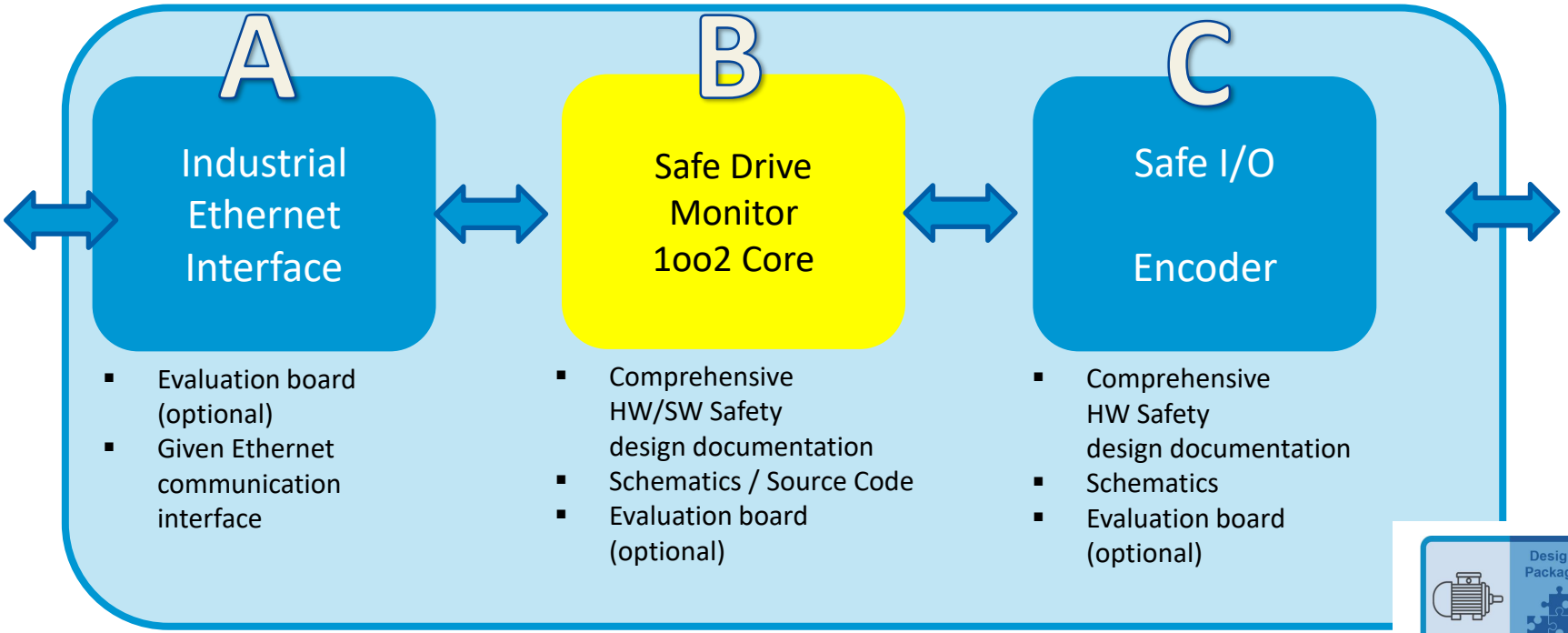
Step-by-step expansion

- Step 1: STO, SS1 triggered by discrete Safe Input (switching off without software)
- Step 2: STO, SS1 triggered by Safe Fieldbus
- Step 3: Safe Drive Functions IEC61800-5-2 with Encoder Feedback
- Step 4: Enhancement with Safe I/O (Logic or Brake Control)

Our consistently modular Design Packages allow a stepwise expansion

MODULAR CONCEPT FOR SAFE DRIVES

Architecture / Functional Modules



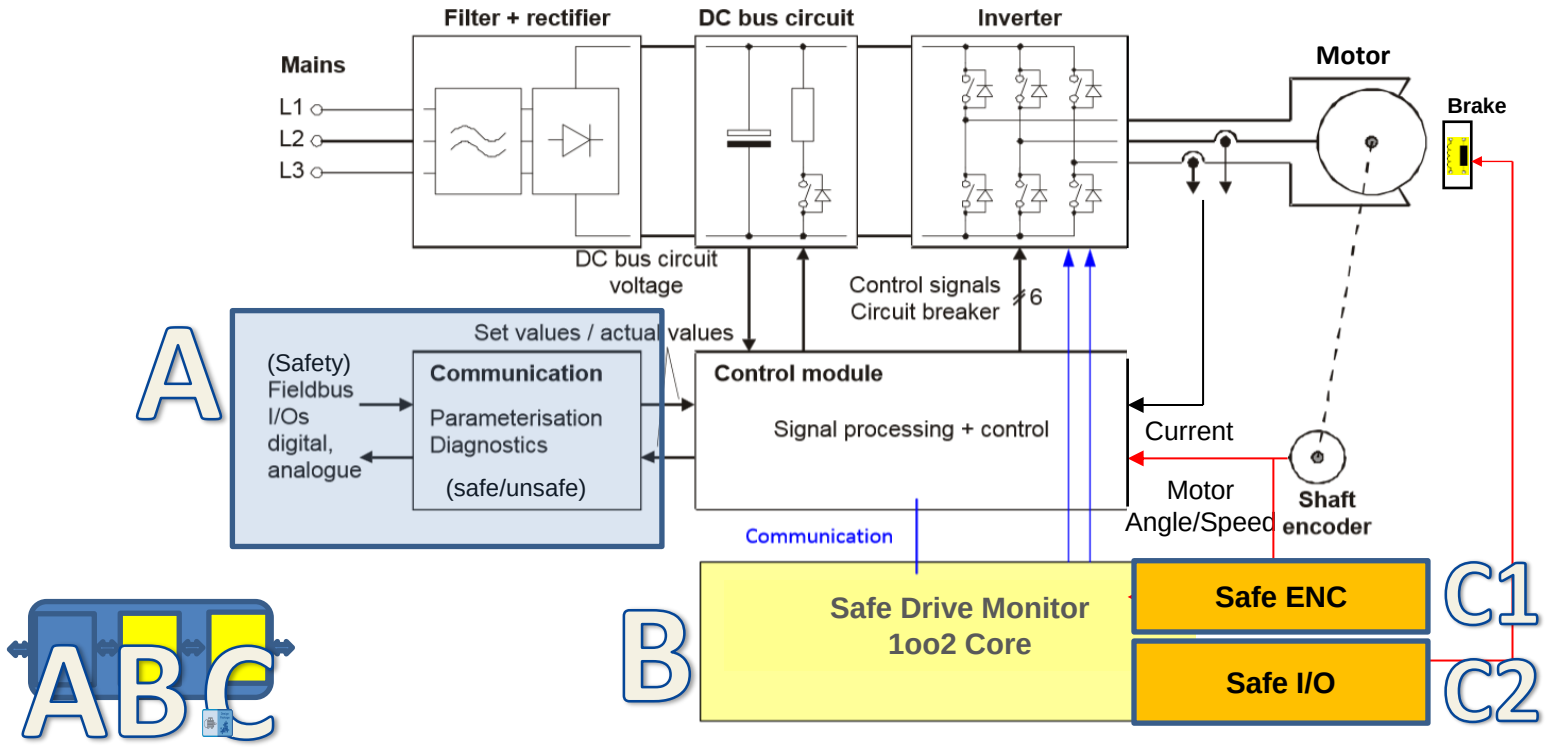
- Evaluation board (optional)
- Given Ethernet communication interface

- Comprehensive HW/SW Safety design documentation
- Schematics / Source Code
- Evaluation board (optional)

- Comprehensive HW Safety design documentation
- Schematics
- Evaluation board (optional)

MOTION CONTROL

SAFE DRIVE MONITOR CONCEPT



IMPLEMENTATION STEP 1

Step 1: STO, SS1 Consulting

- Development Consulting for implementation of STO and SS1 function, triggered by discrete safe input
- Process Consulting for enabling IEC61800-5-2 requirements

Customer benefits:

- Support by MESCO with STO implementation based on consulting services
- Support by MESCO to enable Functional Safety related processes

IMPLEMENTATION STEP 2

Step 2: Design Package Safe Drive Monitor 1oo2 Core
with EtherCAT FSoE Fieldbus interface

- Modular Safety System Software Lib in Source Code with STO interface, task handler, cross com lib for MCU sync and selftest lib, HAL (approx. 29000 Lines of software code)
- SW application for Safe Torque Off function (STO) and Safe Stop functions (SS1)
- Hardware & Software Design Documentation
  acc. IEC61508 SIL3, ISO13849 Cat3 PLe, HFT=1
- SW Lib FSoE Wrapper (FailSafe over EtherCAT) prepared for third party stack
- Build environment files (for IAR, compiler not included)
- Schematics and pcb layout
- BOM / assembly drawing
- Evaluation board B (Safe Drive Monitor 1oo2 Core board + carrier board)

IMPLEMENTATION STEP 2

Options for Step 2:

- Evaluation board A for Industrial Ethernet interface (EtherCAT)
  (flashed version only, without Design Documentation)
- Safety parameterization concept
  Concept documentation with safe parameterization protocol description
  (Consulting service)

Customer benefits:

- Directly useable in SIL3 related projects
- Cost and risk reduction of the project
- Easier product certification due to design documentation
  acc. IEC61508 SIL3, ISO13849 Cat3 PLe, HFT=1
- Shorter time to market

IMPLEMENTATION STEP 3

Step 3: Safe Drive Functions IEC61800-5-2 with Encoder Feedback

- Design Package SW Stack for advanced safety functions
  e.g. SS2,SOS, SLP, SLS, SDI, SBC… acc. IEC61800-5-2
- Design Package SW Stack HIPERFACE DSL black channel
  Both SW Design Packages are running on evaluation board B

- Hardware Design documentation for Safe Encoder HIPERFACE DSL Master
  acc. IEC61508 SIL3, ISO13849 Cat3 PLe, HFT=1
  Schematics and pcb layout
  BOM / assembly drawing
- Evaluation board C1 for Safe Encoder HIPERFACE DSL Master

Customer benefits:

- Stepwise implementation of safety drive functions by adding these Design Packages
- Modular structured development with cost and risk reduction

IMPLEMENTATION STEP 4

Step 4: Safe I/O Expansion (Logic or Brake Control)

- Design Package SW Safe I/O handler for 3x redundant input, 1x redundant output
  Software Design documentation acc. IEC61508 SIL3, ISO13849 Cat3 PLe, HFT=1
  including software source code.
  SW Design Packages is running on Safe Drive Monitor 1oo2 Core
  including HW Design Package Safe I/O

Option for Step 4:

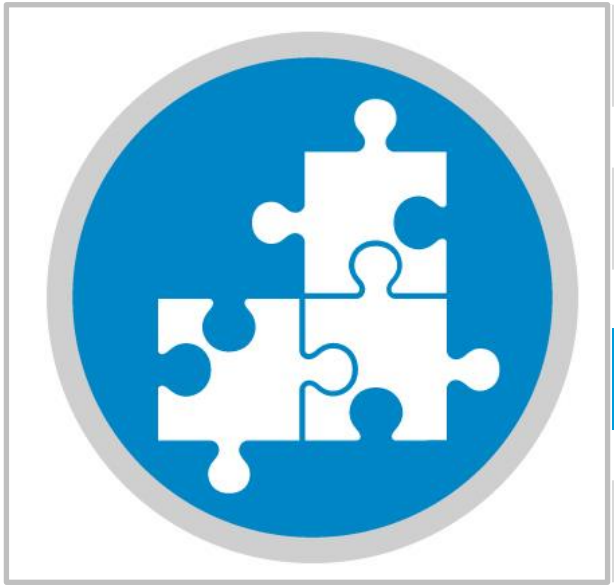
- Evaluation board C2 for Safe I/O expansion
  (Flashed version only, without Design Documentation)

Customer benefits:

- Further product enhancements with Safe I/O functions like Safe Brake Control (SBC), Safe logic I/O, …
- Stepwise implementation and product certification possible

MESCO SAFETY DESIGN PACKAGES

Overview



Architecture of Safety Electronics

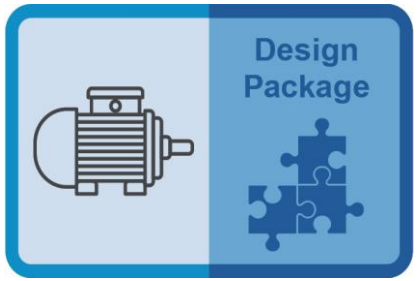
MESCO Safety Design Packages: Description

Select your MESCO Design Package

MESCO Design Packages: Benefit

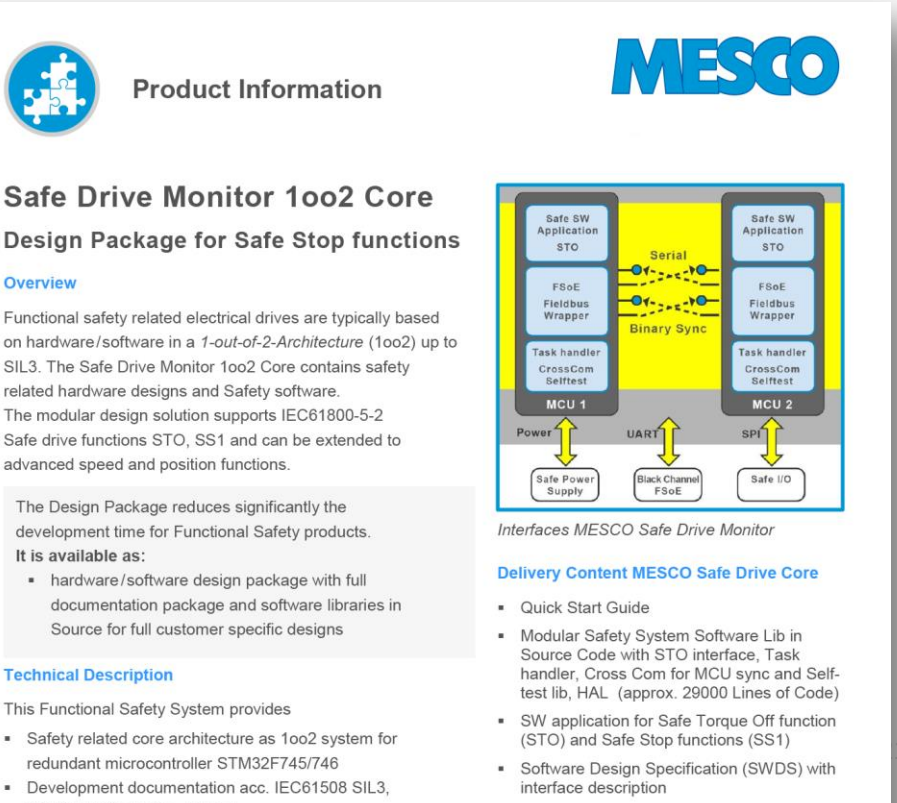
SAFE DRIVE MONITOR 1oo2 CORE

Design Package for Safe Stop Functions



MOTION CONTROL

For details please refer to datasheet (PDF) »
MESCO Design Package
Safe Drive Monitor Core 1oo2 Sil3



Product Information

Safe Drive Monitor 1oo2 Core

Design Package for Safe Stop functions

Overview

Functional safety related electrical drives are typically based on hardware/software in a *1-out-of-2-Architecture* (1oo2) up to SIL3. The Safe Drive Monitor 1oo2 Core contains safety related hardware designs and Safety software.
The modular design solution supports IEC61800-5-2 Safe drive functions STO, SS1 and can be extended to advanced speed and position functions.

The Design Package reduces significantly the development time for Functional Safety products.
It is available as:

- hardware/software design package with full documentation package and software libraries in Source for full customer specific designs

Technical Description

This Functional Safety System provides

- Safety related core architecture as 1oo2 system for redundant microcontroller STM32F745/746
- Development documentation acc. IEC61508 SIL3,

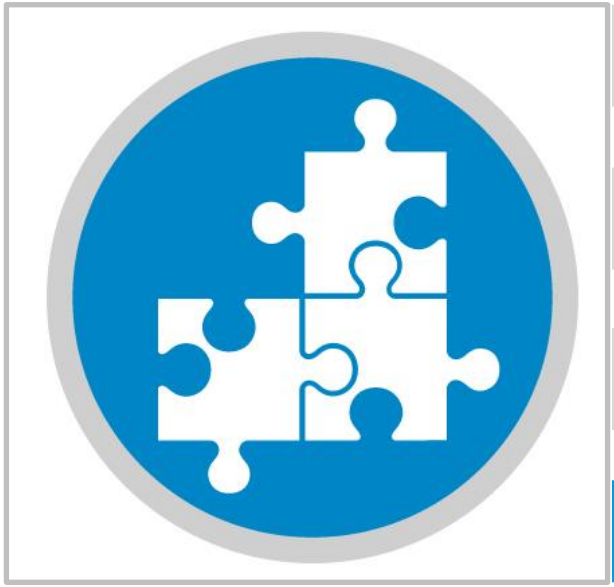
Interfaces MESCO Safe Drive Monitor

Delivery Content MESCO Safe Drive Core

- Quick Start Guide
- Modular Safety System Software Lib in Source Code with STO interface, Task handler, Cross Com for MCU sync and Self-test lib, HAL (approx. 29000 Lines of Code)
- SW application for Safe Torque Off function (STO) and Safe Stop functions (SS1)
- Software Design Specification (SWDS) with interface description

MESCO SAFETY DESIGN PACKAGES

Overview



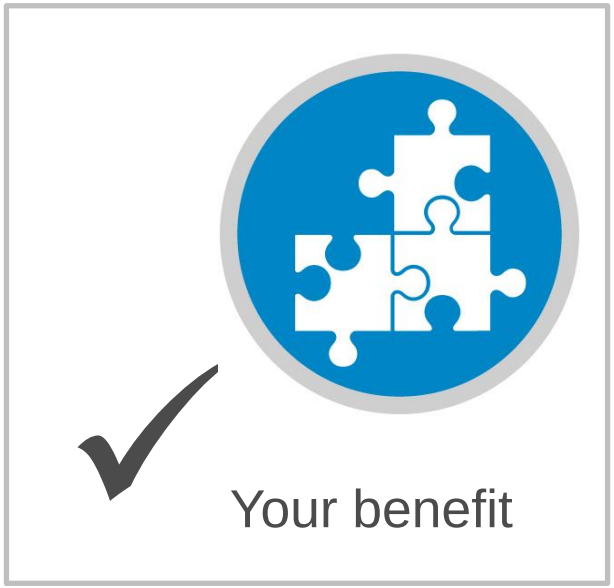
Basic Architecture of Safety Electronics

MESCO Safety Design Packages: Description

MESCO Safe Drive Monitor 1oo2 Core

MESCO Design Packages: Benefit

BENEFIT OF USING DESIGN PACKAGES



- Reduced specification phase
  relying on base functions of the Safety Design Packages
- Reduced development risk
- Reduced development time and effort
- Project cost reduction
- Shorter time to market
- Lower effort in documentation
- Easy protocol certification
- Lower risk *through MESCO‘s TUV certification support*

OUR SAFETY EXPERTISE

Many years of Expertise. Well-trained engineers. Certified processes.

- More than 25 years experience in the development of industrial electronic designs
- > 12 completed projects for safety related applications
- > 8 years close cooperation with TUV
- > 15 years experience on development of safety related electronics
- TUV certified hardware and software engineers
- > 50 MESCO engineers, with Master, PhD certificate in Math, Physics …
- TUV certified and established functional safety management process
- Independent teams for quality assurance and project milestone and gate controlling
- ISO9001 certified, IEC61508 FSM certified
- Fieldbus competence center

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