Technical article

Functional safety efficiently implemented: platform development with Safety Design Packages

September 2024

With increasing machine and system complexity and the flexibilisation of production in line with Industry 4.0, the need for efficient, intelligent sensors and actuators as well as higher machine availability is constantly growing. Functional safety is increasingly being integrated into automation components in order to be able to react more flexibly to increasing requirements.

This has a significant impact on development methods, particularly with regard to compliance with strict standards such as IEC 61508 and ISO EN 13849. Efficient safety development platforms play a key role here, as they enable the reuse and adaptation of existing modules and artifacts. This reduces development time and costs, optimises the use of development resources, minimises errors and speeds up the certification process.

Faster to a certified safety product

MESCO has developed the Safety Design Packages for developers of safety components in order to fulfil the requirements in the area of functional safety. These packages consist of tried-and-tested artifacts and modules that have emerged from fundamental and product-independent developments at MESCO. The MESCO developers provide support to ensure reliable and standard-compliant implementation.

Safety Design Packages – benefits and application

The MESCO Design Packages are a comprehensive collection of over 120 reusable artifacts that provide developers with an efficient basis for their projects. All software artifacts have been subjected to a static code analysis and prepared for unit tests. Developed in accordance with the requirements of IEC 61508, the design packages can be seamlessly integrated into a V-model-based project structure.

The application-specific design packages consist of logically grouped artifacts that are tailored to specific product groups. This has resulted in design packages for the following areas:

- Safe Industrial Communication (both secure fieldbuses and standard fieldbuses)
- Safe microcontroller cores (SIL2 1oo1/SIL3 1oo2)
- Safe power supplies
- Redundant input and output systems
- Safe encoder interfaces
- Safe drive functions such as safe stop or safe speed monitoring

Thanks to these design packages, automation components such as drives, cobots, actuators, gripping and handling systems, encoders, remote I/O, laser scanners, light barriers and many more can be developed in a customised, cost-efficient and targeted manner. Requirements for both SIL2 and SIL3 are covered.

The evaluation boards are based on the design packages and enable the verification of architectural designs, the practical setup of device connections and the validation of feasibility. They are used to create proof-of-concepts or quick functional models without the need for proprietary hardware.

Development platform is the keyword

Nowadays many development departments face the challenge of maintaining existing devices that are based on different microcontroller families and corresponding toolchains. This ties up considerable time and resources that are not available for innovations and new product releases. At the same time, the requirements for new products are constantly changing - be it in terms of interfaces, protocols, functions, AI, safety or security requirements. Here it becomes clear that modularisation in development is essential. Once developed, artifacts can either be reused directly or adapted with minimal effort, which significantly increases efficiency.

The MESCO Design Packages offer a versatile development platform that is flexibly expandable, customisable, scalable and reusable. With this platform, various automation components can be customised and developed, all on a uniform basis. This not only saves time and costs, but also simplifies the handling of known microcontrollers, their tools and possible bugs. This makes pre-development, task division and documentation easier and leads to significant cost savings.

In numerous successful projects and the use of the development platform, MESCO has carried out customised embedded development projects for customers that serve as the basis for complete product families. MESCO is continuously updating and expanding the platform with new, innovative artifacts that meet current requirements, industry trends, standards and technological developments.
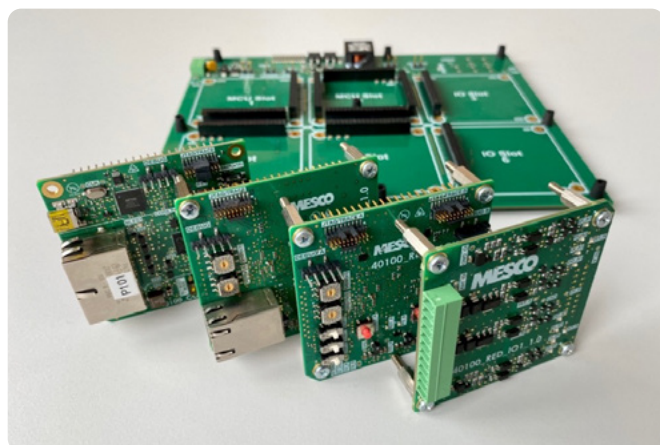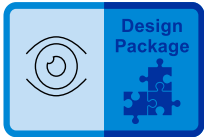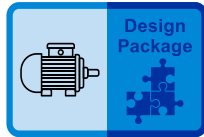

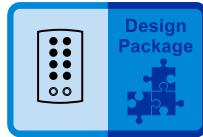Fig1: Safety Design Package: Hardware artifacts & MESCO evaluation boards

MESCO Design Packages

Sensors/Actors

Motion Control

I/O Modules

Safety Design Packages

Safe Drive Monitor	Safe I/O	Safe Field Instruments	Safe Encoder

Safety Artifacts

Software Packages

1oo2 Base

Scheduler	Cross Communication	Device self-tests	Device diagnostic
Failure handling	Parameter storage	Nonvolatile memory	ServiceCom interface
Debug Interface	Hardware Abstraction Layer		

1oo2 Libraries

Safe Drive Functions		Safe Fieldbus	
Safe Stop	Safe Speed	PROFIsafe	FSOE
Safe Acceleration	Safe Brake	Parameter Download	Software Update

Hardware Packages

Schematic snippets	Layout snippets	Documentation snippets

Evaluation Boards

Evaluationboards Safe Drive Brake Control	Evaluationboards PA Communication	Evaluationboards Industrial Communication	Evaluationboards Safety Microcontroller	Evaluationboards Safety I/O

MESCO Safety Design Packages

MESCO Safety Artifacts

1oo2 Libraries

1oo2 Base

Software Packages

Hardware Packages
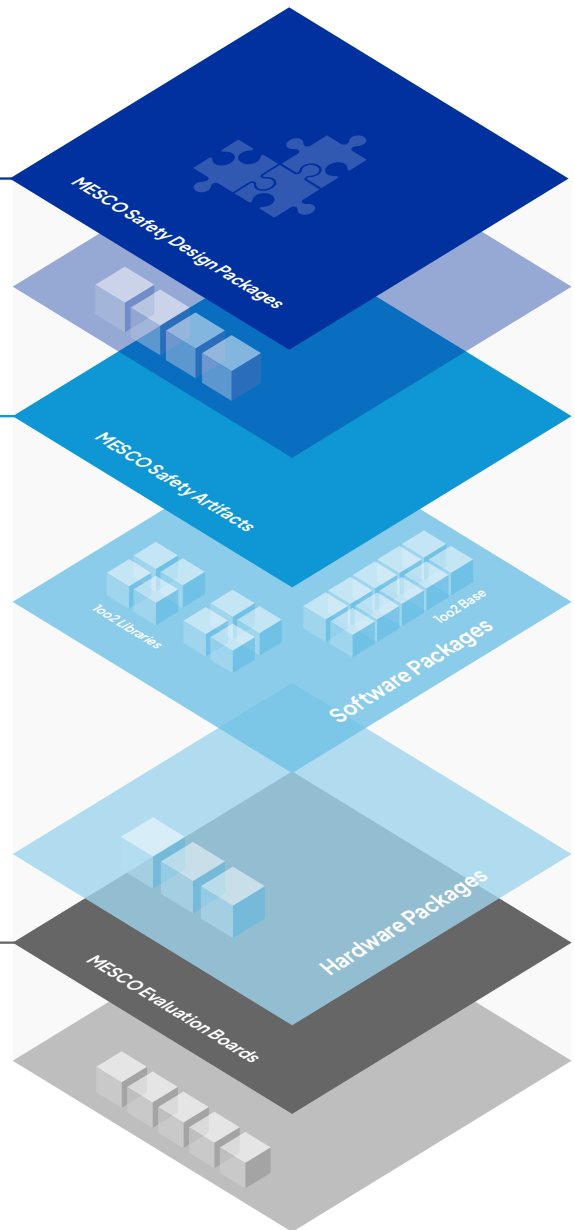
MESCO Evaluation Boards

Fig2: Safety Design Package & Software artifacts

MESCO Engineering: Support and development service

MESCO Engineering offers customised support for the implementation of assemblies using the Safety Design Packages. The co-operation usually starts with technical workshops, followed by the definition of system requirements and the development of safety concepts. The system is then built using evaluation boards for a proof-of-concept, followed by concept approval by a notified body such as TÜV. This structured approach helps to minimise the development risk considerably.
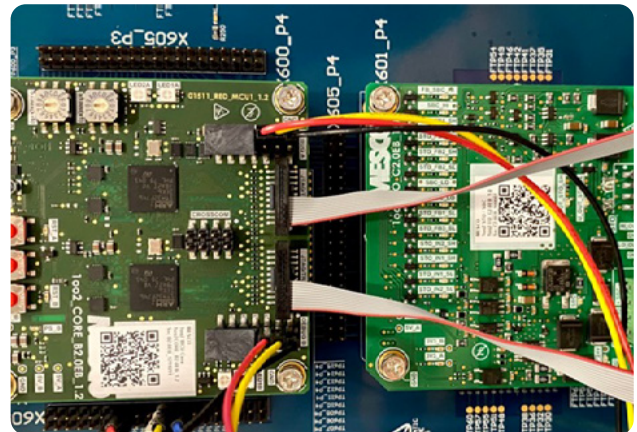

Fig3: Safety Design Package evaluation boards in use as proof-of-concept in the customised safety drive application

The benefits of the MESCO development platform with Design Packages at a glance:

- Highly flexible solution for the development of functionally safe industrial products
- Simplifying the development of devices for factory and process automation
- Reduced development costs and project lead times with high product quality

Your development partner. For 30 years.

...where ideas turn into success!

MESCO Engineering is your partner for innovative electronics developments in the field of process and factory automation. Our core competencies lie in hardware and software development. MESCO excels particularly in integrating technical fields such as industrial communication, functional safety, and explosion protection. Since 1990, MESCO has been providing its customers with up-to-date expert knowledge, comprehensive solutions, and a full development service – from concept to certification.

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