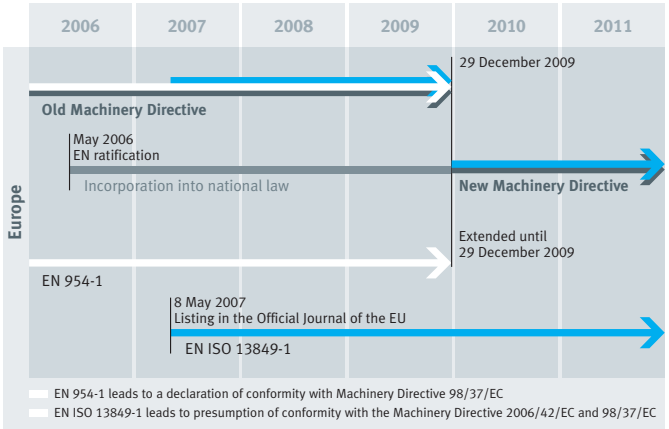
Partnership in safety engineering – a practical example



Situation

- The new Machinery Directive 2006/42/EC – valid from 29 Dec 2009
- The associated standard EN ISO 13849-1 – valid since 8 May 2007

EN ISO 13849-1 and its consequences

An important change is that the separate approaches previously applied for electrical, pneumatic and mechanical systems must now be brought together. That creates a need to compare between, for example, the safety assessments in EN 61508 and EN ISO 13849-1.

New approaches – 10 typical safety functions for pneumatics

Festo solution packages can be used to achieve the required performance level as per ISO 13849-1. The solution packages also include all the data needed for assessment in accordance with EN ISO 13849-1, e.g. using the SISTEMA software from BGIA (Institute for Occupational Safety and Health in Germany) and certification by the BGIA.

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Safety at high speed – machine safety doors

Safety doors on machines need to open and close quickly to keep unproductive, idle periods to a minimum. Yet these kinds of safety systems must meet the demanding safety requirements of the new EC Machinery Directive. The pneumatic high-speed doors developed by Strasser Maschinenbau go beyond the demands of the new standards.

Whether there's a milling cutter throwing out chippings, slivers of material occasionally breaking off a workpiece in a press, or active laser beams with high luminous intensity: workers must always be protected from hazardous production processes. That requires a whole range of laws and standards; and the new Machinery Directive adds a few new requirements "to the pile".

Machine users, for their part, want the highest possible productivity from their machinery in these difficult times. Idle periods due to safety considerations are hard to accept. So if safety engineering is required, it should not become a stumbling block for production, but should be able to be integrated into production systems as smoothly as possible.

A perfect example of successful integration of this kind is the pneumatic safety doors developed by Strasser Maschinenbau in close collaboration with Festo. They run at extremely high speeds, while still meeting all the safety requirements.

Up and down in a flash

To enable the safety doors to be operated at the highest speed physically possible, Festo's system solutions specialists developed a flow-optimised valve manifold. The component, based on the CPE product series, provides the pneumatic drive technology with maximum dynamic response, while also providing fully controlled movement into the end positions. Shortly before the cylinders type DNCB used to operate the doors reach their stop, the system switches over to a valve with a throttle point, so that the doors can be braked rapidly and gently just before their end position. Then they open at speeds of up to two metres a second, allowing the worker or a robot to change a workpiece in no time. The travel times of the safety doors are thus no longer a significant factor in cycle times at many stations.

Strasser Maschinenbau GmbH

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Area of business:
Automation solutions from components to systems based on carbon and stainless steel modular profiles, and solutions for machine safety

Enclosures and "power-operated doors" reliably protect workers from hazardous manufacturing processes.

Powerful pneumatic cylinders DNCB from Festo move specially designed safety doors at high speeds of up to two metres a second.

Reliable safety engineering
Plant operators are on the safe side with Strasser's speedy safety doors. Important safety objectives such as the "safe start-up" and "safe standstill" of the doors are achieved in compliance with the standards.

The safety objective "safe start-up" is realised with a time delay valve from Festo's VZO series. This is connected upstream from the pneumatic drive and makes sure that the cylinders do not start moving until there is sufficient system pressure for the lightning-fast motion to be slowed down again using pneumatic back pressure. That prevents any dangerous uncontrolled start-up.

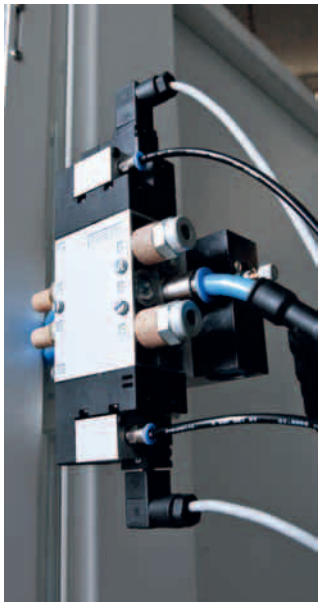
"Safe standstill" of the safety door is ensured by the "MecLock" system. This involves a mechanical contact bar which locks the guides of the doors automatically at the slightest touch. This purely mechanical system has a great advantage: no signal needs to be sent to a control system notifying it of a safety-critical situation, and there is no response delay to be considered. MecLock even protects the machine operator during power failures, when the door falls down by itself, thus preventing injuries.

Retrofitting in good time
The worries many have that the new Machinery Directive could hamper production seem unfounded in the light of this technology. Smart solutions like the high-speed doors from Strasser Maschinenbau enable individual assembly stations to be retrofitted with standards-compliant safety systems with no loss of productivity. There's still time to do so until the end of December.

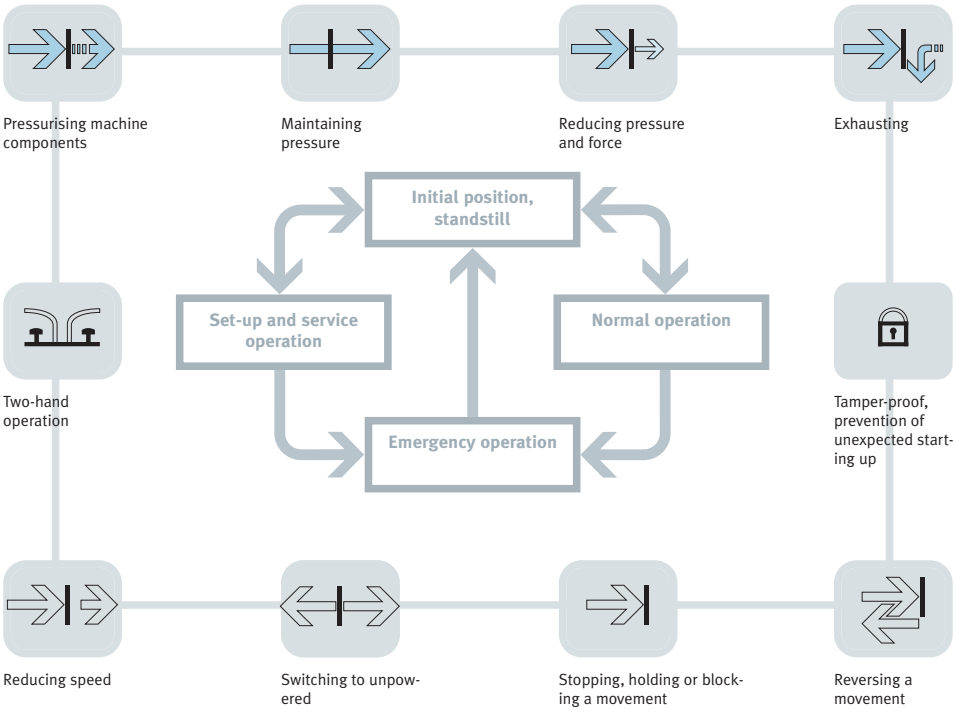
How can I make my machine safer?
The new MD and EN ISO 13849-1 set out the following procedure: 1. risk analysis, 2. risk assessment and 3. risk reduction. The result is residual risk with a defined level of danger (the performance level). There are three options the design engineer can choose from to reduce risk:

1. Designing for intrinsic safety. When that is not possible:
2. Incorporating safety measures into the design and
3. Giving warnings.

The analysis of appropriate safety measures ultimately comes down to 10 fundamental safety functions which Festo has defined for pneumatics (see the diagram on the following page).

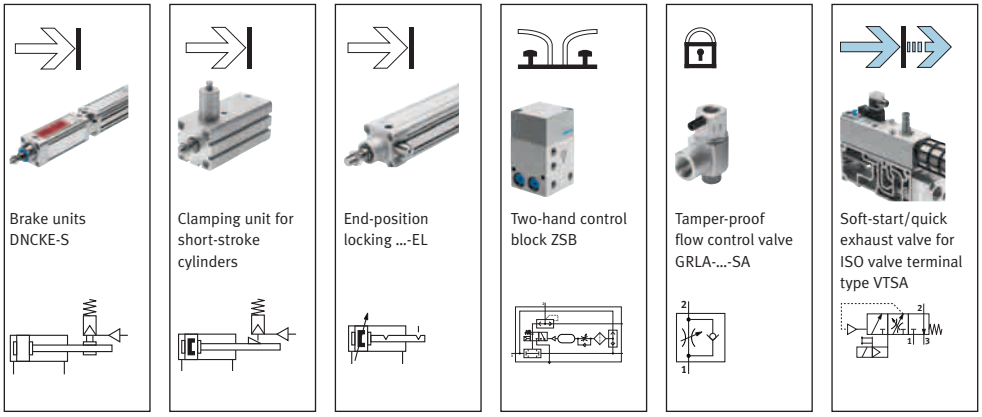


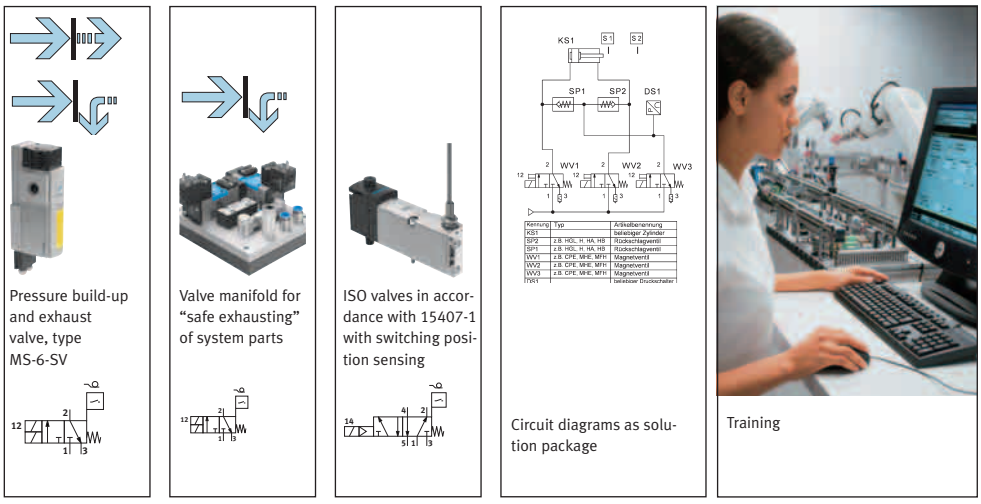
Specially developed by Festo system solutions:
a flow-optimised valve manifold CPE with upstream time delay valve and specially designed throttle point.



The 10 fundamental safety functions as the basis for simple solution development and integrated, mechatronic safety concepts (source: Festo)

Safety@Festo – advice, engineering, products, solutions and training





Will safety engineering be easier in the future?
Safety engineering has always been a challenge for specialists and experts, who are having to think about machine safety in all-embracing "mechatronic" terms today. However, I would like to answer this deceptively simple question with an optimistic triple "YES":

1. Yes – thanks to the all-embracing approach and uniform assessment of electrical, mechanical and pneumatic systems set out in EN ISO 13849-1
2. Yes – thanks to the 10 safety functions defined by Festo for easy achievement of safety goals in accordance with the above standard
3. Yes – thanks to integrated, mechatronic safety concepts incorporating pneumatic, mechanical and electrical systems (fieldbus systems), optionally with BGIA certification.

Additional information
can be found in the "Safety engineering guidelines" (go to www.Festo.co.uk and enter that title in the search box) or via the contact form on the homepage.

Training
www.festo-didactic.com