

## Safety for Packaging Machines

The Bosch business unit Packaging Technology with headquarters in Waiblingen, Southern Germany, has been using complete solutions from JokabSafety for protecting the process and the operators of its Package Makers since 2002, thereby reaching the highest safety category 4 according to EN 954-1 all over the machines.



The PKD 3121 and PKD 3122 BV vacuum Package Makers offer a throughput of up to 130 packages per minute. The operator control is effected via a swivelling control and display terminal mounted on the machine. The first packaging material for the inner bag is fed off film reel. The material is transferred to the pack production. The packs are produced on the 12-part, intermittently operating mandrel wheel. The blank is folded and sealed over the folding mandrel, and the pack, open at the top, is then transferred into the packet chain conveyor. The second packaging material is fed off the imprinted film reel, and the processing is controlled via the print registration detected by a light-beam. The outer wrapping is folded and glued around the sealed inner bag on the mandrel wheel. The pack is then filled by 3 main fillers, the coffee is compacted, weighed, and the top-off amount filled in. In the evacuation segment the packs are evacuated and tightly sealed.

Despite the complexity of the equipment, the design of the safety systems proved to be simple and time-saving thanks to the assistance from the German affiliate of Jokab Safety. The heart of the decentralised complete solution consists of up to 7 safety PLCs Pluto B20 and B16. The decentralised design greatly reduces the wiring. The scalability of the safety technology makes it also interesting for smaller and compact equipment. All this allows for the required time for equipment modernisation and the resulting downtime to be significantly reduced. The non-contact door-monitoring sensors Eden and the magnetic door-locking devices Magne can be mounted on existing equipment. The networking of the Pluto safety PLC with an industrial PC with installed Pluto-Manager software offers the possibility of diagnosis and commissioning support via tele-service.



An Eden non-contact door-monitoring sensor pair is mounted on each stirrer and each protective door. It consists of the active, electrically wired part called Adam and the passive part Eva which acts as an actuator. The sensor is only activated, if the door is closed and the two sensors are face to face. Here, the large tolerance for distance and misalignment ensures easy and uncritical mounting. The sensor has a sensing distance of 0 to 15mm and works free of maintenance and wear. Thanks to the dynamic input and output signal, it is possible to monitor up to 30 non-contact sensors with a Vital1 safety module or up to 150 sensors with a Pluto safety PLC using one channel. Thereby, the highest safety category 4 is maintained, and an information signal indicates the state of each single door.

The speed of the servomotors is monitored with JS-RSA 698 mult-itur absolute

encoders and a Pluto B20 or B16 safety PLC in inching operation, controlled with a JS4D4 enabling device. The 3-position switch allows to safely carry out maintenance and service work on the filling machine. It gives a stop signal in top and bottom position, and a start or ready signal in a distinct middle position. If the maintenance technician squeezes or releases the trigger grip, the machine immediately shuts off. Using the two optional additional pushbuttons, auxiliary functions can be obtained.

The electrical magnet Magne with a holding force of up to 1500N is developed for safety applications in combination with the Eden door monitoring switch. It includes an information output contact which gives the information that the holding force has reached the level needed. Different holding force can be achieved by connecting different voltages between 0 and 30V to the magnet. At zero voltage the magnetic field is completely gone, and there is no residual magnetism.

All safety functions of the PKD Package Makers from Bosch are monitored by Pluto B20 or B16 safety PLC's, which can communicate with each other via a safe bus and provide all machines with the highest safety category 4. The machine requirements are met by an appropriate programming in the office and on the site. Due to the reduction of wiring, design and material, the machine-builder achieves considerable cost savings and the small size of the only 45mm wide saves space in the control cabinet.

The 22.5mm wide safety relays BT50 and BT51T connect safety components, such as emergency switches or interlocked hatches, and increase the number of outputs. It offers 4 NO safety outputs, a test input with complete internal supervising and hardwired selectable delay times from 0 to 1.5 seconds. The test input is intended to supervise that contactors or valves have dropped out/returned before a new start can be permitted. The test input can also be used for starting and the start button can be supervised. The four safety outputs can be delayed by hardwire connection on the terminals. Delayed outputs are used when the machine needs to be stopped softly using the software control of the machine.

Dietmar Rollmann, group manager for electrical engineering and design in the product range of Package Makers, is very satisfied with the complete solution from one source offered by Jokab Safety. The cost-effective and cost-saving safety package around the Pluto safety PLC is decentralised and reaches the highest safety category 4 on all machines. The Pluto Manager software and its updating via the Internet are made available to the user free of charge. The electrical engineer also appreciates the quick service, the competent advice and the technical support during the commissioning of the comprehensive package makers. Mr Rollmann had good experiences with reliable delivery dates, the long product life, the simple operation and programming of Pluto as well as the easy mounting of the Eden door-monitoring sensors with a large mounting tolerance. He also praises the company-neutral training on machinery safety and the clearly structured safety handbook, which makes the product choice very easy. The worldwide presence and availability of spare parts as well as the approvals for Europe, North America and Asia also played an important role for Dietmar Rollmann.