

Automated loading system for blanks magazines — Basic principles



Labour-intensive and physically strenuous work was successfully automated at Heineken in Zoeterwoude, the specific work involved being the loading of cardboard onto the various packaging lines for the export products. Automation of these operations was thought to be impossible until recently, partly on account of the tremendous variety of types of packaging and the materials required. CSI successfully used advanced robot technology and ingenious applications to realise the target set, making this a famous first for both parties.



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The destacking and unpacking of cardboard and its loading into the magazines of the individual machines in the final packaging lines in round-the-clock operation was strenuous work, but it was also work comprising a number of complex operations.

Two of what will ultimately be five robot cells to be implemented are described on the reverse side. The first continuously loads two interior case-divider erectors, carrying out a number of very complex operations in the process. The second destacks pallet loads of blank trays noiselessly and extremely efficiently, and places the blanks continuously in the magazine of the tray loader.

Cardboard principles

The "living" behaviour of cardboard packaging material is a well-known and not greatly appreciated phenomenon throughout the packaging world. Weather conditions can affect the behaviour and therefore the manageability of cardboard to quite an extent, while road transport can also lead to shifts in the blanks on the pallets. This is naturally of less importance in the case of manual handling, but the

tolerances within which pallet loads can be conveyed to the robot become exceedingly important in the case of automatic handling. Structural consultations between the customer, the cardboard suppliers and CSI resulted in stricter norms for supply procedures. The design of machinery and software for handling took extremely divergent tolerances for the packaging materials into consideration, so that the machines are also equipped to cope adequately with these size tolerances. In addition, the robots are fitted with "autotech" features, which means that the machines are equipped with sensors and photocells which the robot uses to check the basis co-ordinates constantly and to correct them itself if necessary. In this way, the robot adapts in the course of the cardboard-clearing activities to the new situation which has been perceived as deviating from the standard setting. CSI's years of experience in the design and construction of packaging machines, in addition to the corresponding knowledge of the behaviour of cardboard material, have been of immense value in ensuring the success of this project.



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Clamping and removal function

The required number of blanks is tightly clamped by the robot gripper, which is achieved by sliding in the support fork while the opposite side of the package is being firmly pressed down from the top at the same time. The pack is subsequently removed and the motion in the direction of the blanks magazine of the tray loader begins.



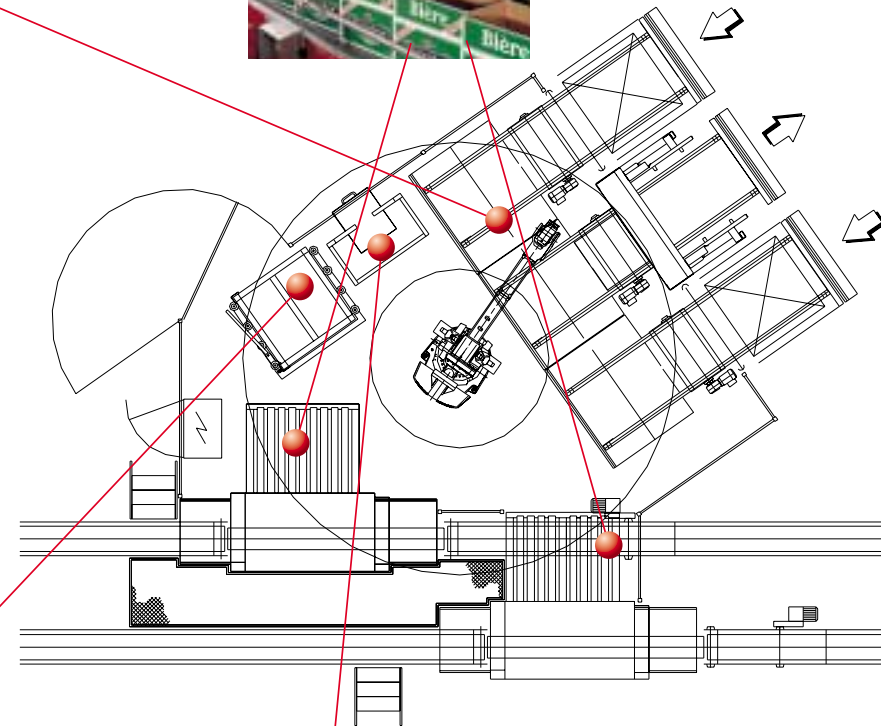
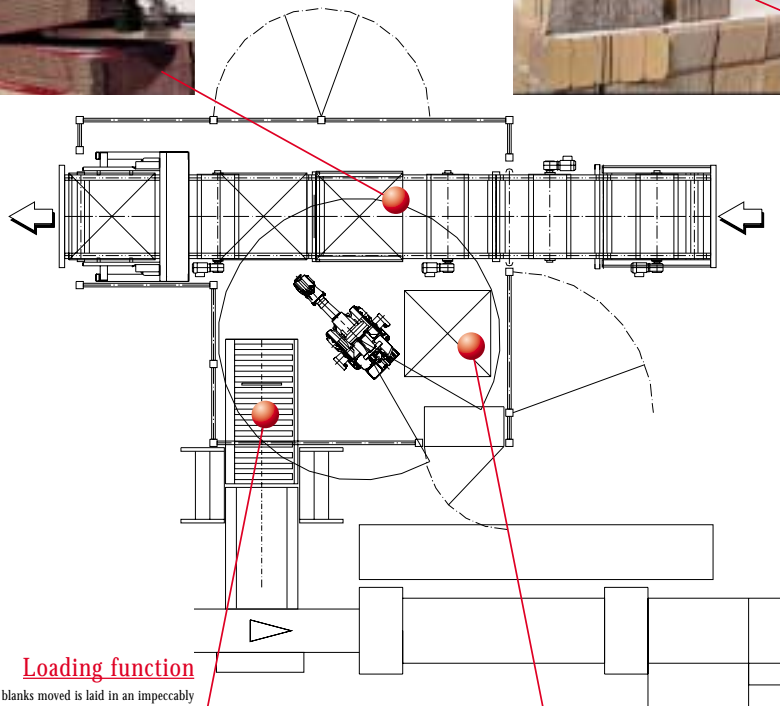
Separating function

The bundled cardboard case dividers are separated from the adjacent pack of case dividers by inserting two pins integrated in the gripper head into the pack to be picked up. These insertion pins pull the pack free of the rest of the pallet layer. The pack can now be clamped on both sides in order to be picked up.



Loading function

The gripper head now brings the case dividers to just above the magazine. The integrated robot hand is opening the magazine in the meantime, so the pack of cardboard can be loaded in one fluent motion. Following this, the robot places the press-on stamp against the pack which has just been loaded, so that the "fresh" blanks loaded can be pressed firmly into place.



Loading function

The quantity of blanks moved is laid in an impeccably taut pile on the feed conveyor of the tray loader, which can be fed automatically into the blanks magazine of the tray packing machine after completion.



Sweep-off function

In between the other operations, the bottom layers and interlayers are taken of the pallet and carefully stacked on a waiting return pallet using integrated vacuum technology.



Destrapping and cutting function

The straps enclosing the bundle of case dividers loaded will have to be removed before the bundle can actually be fed into the case erector. The gripper head therefore keeps the straps free of the clamp grip while picking up the bundle again and then puts them on a curved profile, causing them to come free of the cardboard. An ingenious scissors-function integrated into the curved profile now cuts through the straps, which are automatically pulled off the pack and fall into the refuse bin because the robot head subsequently lifts again. The pack of case dividers is now definitely ready to be loaded into the blanks magazine.