Automatic Filter Loader for Seedex Filters

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The insertion of filters into casting moulds has always been a manual operation to date. The reason for the lack of automation has been the packaging in which the filters are supplied by the manufacturers. Any attempts to automate the insertion of filters have failed so far because the filters had to be positioned accurately before loading. Therefore a manual operation was necessary to place the filters from the packing into the centring or magazines of a filter loading device, thus causing further costs..

A solution was found by the foundry automation experts from Robotec Engineering GmbH who developed a flexible filter loading system designed to pick up Seedex filters (manufactured by Foseco, Borken) from the packing stack and insert them into a moulding line (picture 1).

This filter loader consists of two small robots who share the filter insertion operation. The first robot picks up the palletized filters from the packing stack, while the second robot inserts the filters accurately into the mould. A conveyor belt transports the packing stacks to the moulding line where first an operator cuts off the cover from the cardboard box and turns the entire box upside down on the conveyor belt (picture 2). After he has pulled off the box from the filters, the stack with its intermediate paper layers remains on the conveyor.

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After this short sequence the operator is free to perform other operations, while the filter loader proceeds to insert the filters fully automatically. The conveyor belt shuttles the stacks into the system as soon as the preceding stack has been completely processed. Now the first robot commences operations. Using a special sensor technology it first searches for the stack and measures its position on the belt. The stack does not need to be centred. When the exact position of the stack has been determined, the robot starts to pick up the palletized filters from the stack. It always picks up two of them, using the same sensor as for position detection. The filters are suctioned from the top by an exhaust fan and a suction nozzle for each filter. It is not necessary to position the filters accurately, as they are constantly detected by the sensor and can be picked up quite inexactly by the suction nozzles (picture 3).

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To insert the filters accurately into the moulding line, the removal robot places the filters into a centring station. This station comprises several deposit places which not only centre but also buffer the filters. This buffer zone serves as the decoupling point of the removal robot and the loading robot. In this way the removal robot is provided with sufficient time to load a new stack on the conveyor belt without slowing the loading robot down. The removal robot not only loads new filter stacks but also removes the intermediate paper layers from the stacks. Once a layer is completely picked up, the removal robot uses the suction nozzle to suction the paper at a specified spot, thus pulling it from the stack and disposing of it in a container next to the line. Now the next filter layer is ready for pickup (picture 4).

In the centring station two layers comprising six filters each can be buffered. A pneumatic device moves the filters in the lower layer to a mechanical stop where they are handed over to the loading robot at a defined position. This robot removes the filters individually from the centring station. The filter is pushed pneumatically into the defined position until it is safely gripped by the robot (picture 5).

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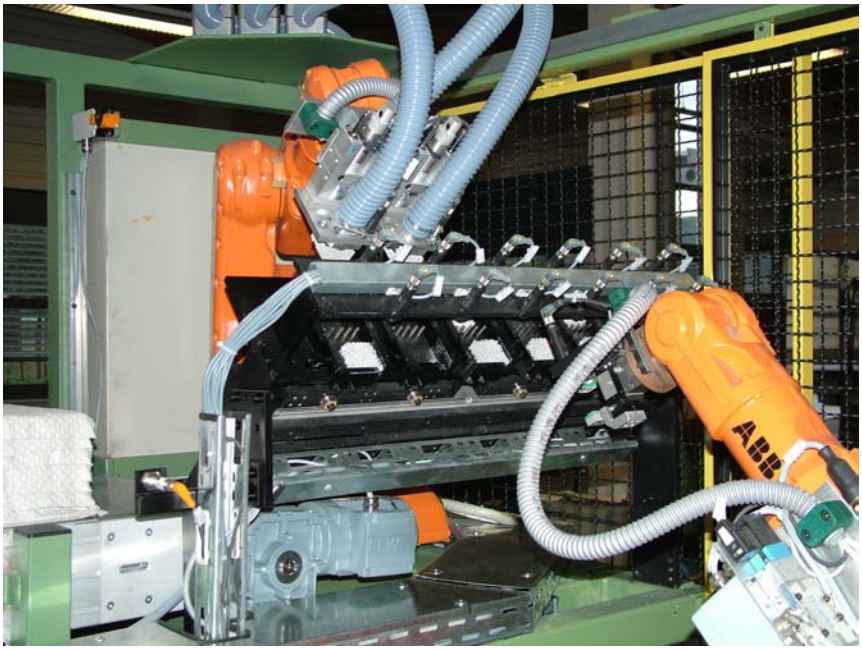

Now the centring opens and the robot moves with the filter held in its gripper over a suction device which sucks off the fines from the filter. The loading robot then inserts the filter into the moulding line. The deposit places are pre-set in the robot via freely definable coordinates. It is therefore possible to change the coordinates or add a new type without any programming skills. As an option the loading robot can be equipped with a PC which stores the deposit coordinates of all types to be manufactured in a database for future production runs. The operator may retrieve and use the stored data either on demand or automatically if the same product is manufactured again. This reduces the set-up time for the filter loader to a minimum while providing highest flexibility.

The filter loader described is currently in operation with a DISA moulding line with a cycle time of eight seconds. The complete system is mounted on rollers and can be moved from the moulding line at any time. When it is in operation with the moulding line, it is centred on the floor. The flexible design of the system allows the filter loader to be used for any casting filters and moulding line types (also horizontally split flasks).

The filter loader developed by ROBOTEC Engineering GmbH represents another state-of-the-art solution for moulding line automation, rounding off the company's innovative range of products which also includes feeder drilling robots, casting robots, core setters and chaplet loaders.

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