Flexible and low-cost solution to increase the competitiveness of plastic over-injection moulding process

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Scope

The work presented in this paper aims to automate the feeding of bent wires to a plastic injection machine to reduce human intervention in the process, as well as extract the over-injected product.

Methods

The research carried out through this work was based on an industrial need, which was taken as a starting point for the development of a solution that could be transferable to other similar situations. With a view to develop a solution that would achieve the intended purposes, that is, finding a solution capable of fixing the wires and, after injection, removing the complete product from the mould, for a wide family of similar, but different products, the Action-Research methodology was used.

Results

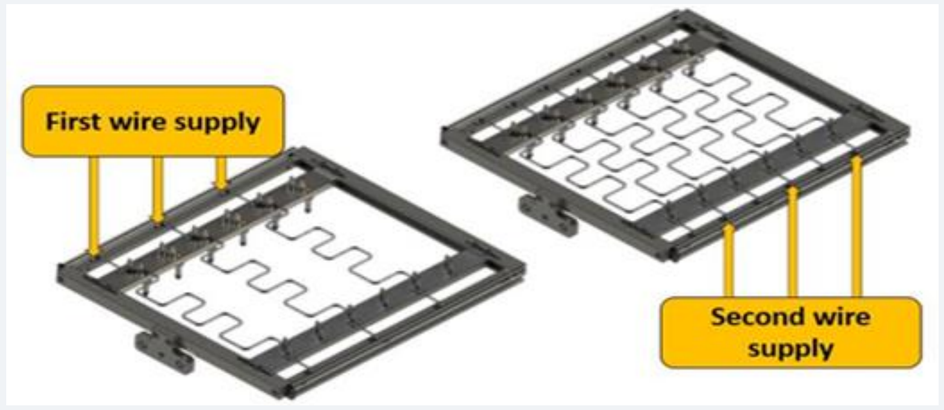

Fig.1. - Drawer system with the positioning jig for the wires

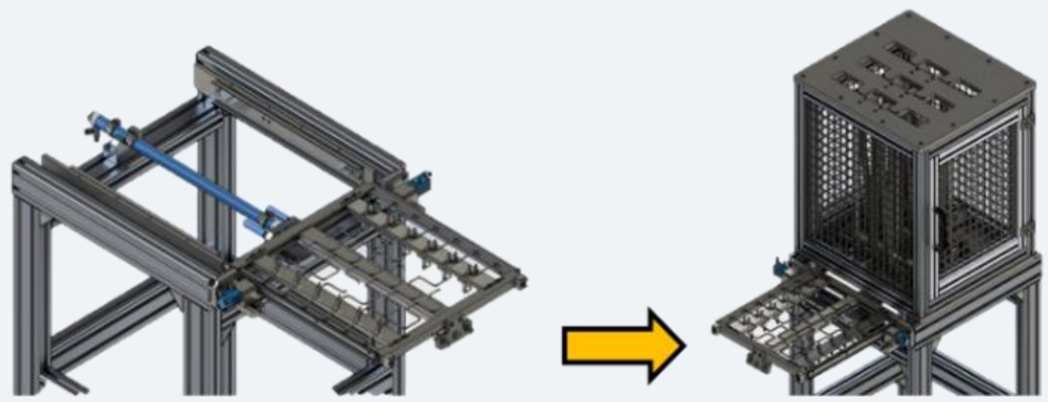

Fig.2. - wires storage tower (right hand) and movable drawer (left hand)

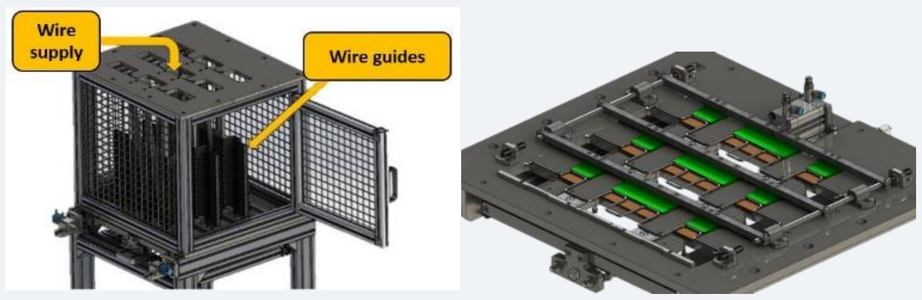

Fig. 3. - Guide columns and the supply system of the wires to the jig in the drawer, respectively

Fig.4. - Rotary manipulator and conveyor

Discussion and Conclusions

This work intends to prove that complex problems can be solved with the help of automation, with low costs and without the need for robotics, presenting a very short period of return on investment and not implying drastic changes in the company's layout. As the main outcomes and transferable knowledge, the following achievements should be considered:

- A new system of storage and organized dispensing of wires has been created that work as an insert in a final product consisting of shaped metallic wires over-injected with polymeric material;
- The use of the same gripper for feeding wires, adjusting / tamping them in the mould and subsequently extracting the over-injected part is equally innovative and can be replicated in many other situations found in the production of several components;
- The use of extremely compact and low-cost solutions can also be an encouraging factor for the application of similar systems in other projects in the automotive industry, or even in household products.

This work was induced by a concrete need of a company linked to the production of components for seats for the automotive industry, and it was necessary to create and implement a new concept of wire feeding and extraction of the over-injected product from polymer injection machines. In view of the existing layout and the cost of the space occupied, space and budget restrictions were imposed. Innovative solutions were developed for the automatic supply of previously formed wires.

The return on investment can be realized in less than 5 months, productivity gains are around 20% and 3 job positions are discarded (1 for each shift of the company), who can receive training and get higher skills that can benefit the company in other processes. This work followed the Action-Research methodology, producing knowledge that can be proficiently used by other industries linked to the same sector, or even to different sectors, allowing to expand the range of low-cost solutions for the automation of industrial processes.

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