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TELESCOPIC MANIPULATOR FOR THE AUTOMATIC EXTRACTION OF RUBBER MANUFACTURED ARTICLES

The MANIPULATOR IS a machine for automatically loading and unloading moulding presses. THE HANDLERS are stand alone electric pneumatic and/or hydraulic units which are coupled to vertical and horizontal injection compression presses to remove moulded pieces and to load inserts. Because they require very limited installation space, the standard tools which are used to automate the insert loading operations, to remove moulded items, to remove and separate flashes from extracted items and to position such articles in a precise order, can be mounted easily on the compact base of the handlers

- **REDUCED THE TIME OF ITEMS REMOVE**, because it's made at the same time for all the items and not one by one as in a manual removing cycle.
- **REDUCED MANUAL LABOUR**: cycles are completely automated and therefore one operator can control several machines.
- **REDUCED OPEN MOULD TIME**, then smaller moulds cooling and smaller vulcanization time.
- **ELIMINATION OF UNDUE CYCLE STOPS** and their pertinent problems due to moulds cooling down, such as scraps due to insufficient heating, moulds cleaning and eventual removing of them, purges for cleaning the nozzle from prevulcanized material.
- **REDUCED MACHINE DOWN TIME**: it is no longer necessary to wait for the operator to remove moulded items.
- **IMPROVED QUALITY AND CONSISTENCY OF MOULDED ITEMS**: continuous extractor cycles eliminate hazardous open machine down time due to operator absence and/or extraction speed, thus preventing the mould from cooling off and/or the compound from curing in the injection pot and extruder, which may change the physicalchemical properties of the moulded item.
- **THEY PROVIDE A RAPID RETURN ON INVESTMENT.**
- **IMPROVED PLANT OPERATING TIME**: simplifying the machine work load programming, it's really easier to programm, because of costant cycle times.
- **MORE FLEXIBILITY**: the handlers can be simply coupled to similar machines, compatible to their pertinent electric and pneumatic connections taps: they can be used on several similar moulds with small differences in tap positions.
- **REDUCED MANUAL LABOUR DEDICATED TO ITEMS TRIMMING**: the handlers use allows to remove and part automatically the moulded items burr straight through during the removing cycle.

1 General description of the machine

This machine is used for the automatic extraction of rubber pieces pressed with vertical presses and with presses that are compatible with it.

This machine is provided with PLC-controlled, electrical and pneumatic handling, and is composed of a group for the horizontal movement and a group for the vertical movement of mechanical hands. The group for the vertical movement runs in a bar with vertical slides, which is connected to the tubular base, in which the pneumatic valves block is located.

The framework is subdivided into three areas:

- A rear area for the running of the slide bar of the horizontal axis and the relative cable-holding chain
- A central area for the running of the horizontal axis with the relative cable-holding chain and the vertical movement axis
- A front area for unloading pieces that have been extracted from the mechanical hand.

At the end of a certain number of pre-defined, adjustable cycles the container located in the unloading opening and in which the pressed pieces have been deposited can be removed and replaced with an empty container.

The container replacement operation is carried out by opening the mobile gate located on the front left side of the manipulator.

The whole perimeter of the manipulator is closed by means of a series of panels fixed in the tubular profile slot. The front side is provided with two mobile protections to favour the unloading and container replacement operations, as well as the adjustment of pneumatic valves, while the left side is open and must rigidly lean onto the press, from which the pressed pieces are to be drawn. The manipulator is pre-disposed so as to allow a conveyor belt to be fitted in, which consents to evacuate pressed pieces, as an alternative to drawing through the container.

The machine is composed of:

- An electrical linear unit for the horizontal movement of mechanical hands
- A pneumatic linear unit for the vertical movement of the horizontal axis and mechanical hands
- A unit with three mechanical hands for extracting pieces
- A device with three mechanical hands for burr stripping (optional, not included)
- A device with three photocells to check that the extraction of the extracted pieces has been carried out
- An electrical panel with PLC control, selectors and buttons
- A pneumatic system
- A front side gate
- A front area, which is to be closed by the press presence

2 Description of the operation principle

The manipulator approaches with its front side open to one of the free sides of the press, normally its front or lateral part.

After the vulcanization (reticulation) time has elapsed the press opens vertically.

At the end of the opening run, with closed protections and the press front gate open, and only in case of extraction on the front side of the press (for extraction on other sides the front mobile gate of the press must be closed) the manipulator, after checking that the pieces previously extracted have been ejected, enters into the press tables and approaches the mould at the gripping point. Before the end of the run in an intermediate position the protection shells are oriented (optional) so that they can follow the template of the pieces to be extracted.

At the end of the horizontal forward movement of the arm the burr pliers close.

After gripping and after the programmed, adjustable arm exit time has elapsed the arm makes a horizontal arm exit movement for a programmed, adjustable run. During the arm exit the injection channels and the burr are stripped from the pressed pieces (optional).

During the arm exit you can detect the presence of burr in the gripping pliers (optional).

At the end of the exit movement the arm goes back for the 2nd time into the press up to the piece gripping position. At the end of the horizontal run the arm comes down up to the piece gripping position and when the gripping position has been reached the piece-gripping pliers close.

At the end of the piece-gripping operation, after the programmed, adjustable pause time air is blown between the piece and the bottom die, so causing the breakaway of the pressed piece during the exit run from the press. At the end of the breakaway run, which is programmed and adjustable the arm comes out and extracts the pressed pieces through this movement.

During the exit movement more air is blown to facilitate the pieces extraction. At the end of the second arm exit the head makes a vertical movement up to the piece presence check position.

At the end of the vertical run the piece pliers open for the programmed, adjustable time.

When the pliers opening time has elapsed the extracted pieces fall into a special container located in the pieces unloading area or onto the conveyor belt. The burr pliers open up again (optional) for the programmed, adjustable time and let the burr and scrap fall into a special container.

After the pieces and burr have fallen the manipulator ascends up to the position "high vertical axis". At the end of this movement the manipulator executes the vertical and horizontal axis origin search.

At the end of the origin search cycle the manipulator seeks the entering dimensions to the press to start a new extraction cycle at next press opening.

At the end of a previously programmed, adjustable cycle, the acoustic and luminous indicators indicate the operator that the evacuation of the extracted pieces and burr can be carried out. This operation can be carried out only when the press is open, the manipulator is at a standstill, and the message on the display indicates the container change and the light-blue lamp located in the reset button is switched on.