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MECHANICAL HANDS (PLIERS) FOR THE MANUAL EXTRACTION OF RUBBER MANUFACTURED ARTICLES

Mechanical hands (pliers) are pneumatic units for removing manufactured articles (sleeves and bellows) made of rubber from the males, on which they are pressed. Mechanical hands (pliers) can be applied to anthropomorphic robots or manipulators with Cartesian axes. They are composed of a basic, extremely solid structure, on which different tools can be easily fitted with minimum overall dimensions (mechanical fingers or pliers), which are normally used for extracting pieces.

MECHANICAL HANDS (PLIERS)

- **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. La conformazione delle dita di presa permettono di ancorare meglio i pezzi da estrarre al beccuccio per insufflare l'aria favorendo il rigonfiamento del pezzo con conseguente riduzione del tempo e della forza di estrazione.
- **REDUCED MANUAL LABOUR**: in quanto si possono effettuare cicli più veloci 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 constant 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.

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1 General description of mechanical hands (pliers)

Mechanical hands (pliers) are composed of a basic, extremely solid structure made of aluminium profile, in which different gripping fingers, which are normally used for extracting pieces can be easily fitted with minimum overall dimensions.

The handling of gripping fingers is carried out by means of a lever device. The levers are operated by a pneumatic piston. The opening and closing movements of the pliers are carried out by pressing the pneumatic buttons, which are normally located in the rear part of the pneumatic actuator. The mechanical hands (pliers) are provided with an air-blow lip, which allows an efficient separation of the manufactured article from the male and facilitates its extraction.

The complete equipment of mechanical hands is composed of:

- A pneumatic actuator for handling gripping fingers.
- One or more air-blow lips to blow air between the male and the internal surface of the manufactured article to be extracted.
- Two or more gripping fingers with removable inserts, which can be configured according to the shape of the manufactured article to be extracted.
- An explosion-proof device (pipe) for manufactured articles. On the front side of the pneumatic actuator a sheathing can be applied, which could be single or telescopic, containing the external part of the manufactured article to prevent explosion during air blowing in the extraction phase. For big sleeves the containment pipes are telescopic and can also be adequately unloaded to contain their weight and to create anti-slide grips for the manufactured article during the extraction phase.
- A device for adjusting the closing strength of the gripping fingers. The mechanical hands are provided with a valve for adjusting the closing pressure of the gripping fingers, which allows the fine adjustment of the closing strength without causing any tearing of the manufactured article and at the same time allows to apply the maximum possible strength for the quick removal of the pieces.
- A device for adjusting air-blow pressure for the extraction. The mechanical hands are provided with a valve for adjusting the air-blow pressure, which allows an efficient separation of the manufactured article from the male and facilitates the extraction of the sleeve/bellow.
- A device for applying silicone inside the manufactured article to be extracted. This device for the internal silicone application allows – during the blowing in phases for the breakaway and the extraction of the manufactured article – to atomize some detaching substance in the air being blown in so as to facilitate the sliding of the manufactured article to be extracted.
- A safety device for the operator. The mechanical hands are provided with a safety device, which allows to operate the gripping fingers only if both the operator's hands are busy on the control buttons and outside the lever area, as well as in the gripping fingers handling area.
- A weight balancing device for the mechanical hands. The mechanical hands are provided with a weight balancing device, which avoids the operator to get tired when using the machine. The balancing device can be calibrated according to the weight of the equipment to be used. This is particularly important when very big mechanical hands are used for sleeves or bellows with big sizes.

2 Description of the operation principle

When the press opens and the males are in the extraction position the operator fits the lip into the front part of the male, between the male and the internal part of the sleeve/bellow to be extracted. At the end of

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this fitting operation the operator presses the button that controls the pliers closing and after the finger closing time and the time necessary to apply pressure to the fingers has elapsed the operator – by pressing a button or by means of a pedal valve – activates the extraction air blowing to separate the manufactured article from the male. After the necessary time for separation has elapsed the operator – by moving the pliers away from the male – drags the pressed manufactured article until it has been completely extracted from the male.

At the end of the extraction movement the operator can rotate the pliers downwards, open them and let the manufactured article fall into a special container. After the piece has fallen into the container the operator interrupts the air blow and prepares for the extraction of the next piece.