

HEADS WITH MULTIPLE MECHANICAL GRIPPING HANDS FOR CARTESIAN ANTHROPOMORPHIC ROBOTS

Heads with multiple gripping hands are electro-pneumatic units for removing rubber parts (sleeves and bellows) from the males, on which they have been pressed. They can be fitted to anthropomorphic robots or manipulators with Cartesian axes.

Heads with multiple gripping hands can be of a **MOBILE** or of a **REMOVABLE FIXED TYPE**.

MOBILE MULTIPLE HEADS are composed of a basic, extremely solid structure made of aluminium profile, on which – with minimum overall dimensions – mechanical gripping hands can be easily fitted, which are normally used for extracting rubber manufactured articles. The heads can be fixed directly to the wrist of the anthropomorphic robots or to manipulators with Cartesian axes. The coupling is carried out by means of flanges with drills complying with ISO standards or flanges with prolonged centering pins to facilitate the coupling of bigger heads.

Operation principle: the extraction of manufactured articles is carried out through the movement of the head towards the male part of the mould, from which the article is to be removed. The males of the mould must be in the same position. Special centering pins make sure that the alignment between the blow lips and the mould male part is accurate.

FIXED REMOVABLE MULTIPLE HEADS are composed of a basic, extremely solid structure made of aluminium profile, on which – with minimum overall dimensions – mechanical gripping hands can be easily fitted, which are normally used for extracting rubber manufactured articles. The heads can be fixed directly on the plinth or fixed structure inside the island of job. The coupling is carried out by means of flanges with drills complying with ISO standards or flanges with prolonged centering pins to facilitate the coupling of bigger heads.

Operation principle: the extraction of manufactured articles is carried out through the movement of the mould male parts, from which the article is to be removed towards the fixed removable head. The mould males are to be translated or moved towards the head by anthropomorphic robots, Cartesian manipulators or translation axes. Special centering pins make sure that the alignment between the blow lips and the mould male part is accurate.

Heads with multiple gripping hands of the mobile and fixed, removable type are composed of:

- **A series of gripping hands for extracting a whole row of manufactured articles**, complete 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.

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- **A device for the ejection of extracted pieces**
- 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.
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- 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.
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- **A device for checking that the pieces extraction has been carried out.** This checking device is normally composed of an optical fibre sensor for each piece to be extracted. Its function is to detect the presence of the piece at the end of the extraction phase, the fall of the piece in the release phase, as well as the starting of a new extraction cycle.
- **A quick connection plug for pneumatic connections.** All pneumatic connections are conveyed into a single quick connection plug to reduce tooling time as much as possible and avoid any connection mistakes.
- A quick connection plug for electrical connections. All electrical connections are conveyed into a single quick connection plug to reduce tooling time as much as possible and avoid any connection mistakes.

Heads with multiple gripping hands of the mobile and fixed, removable type can be completed with optional devices, such as:

- **A device for linear burr extraction** complete with a series of mechanical gripping hands for removing burr through a linear movement, whose carrying out time is to be summed up to the extraction handling time.
- **A device for linear burr extraction in masked time** (as an alternative to the linear burr extraction device), complete with:
 - A series of gripping hands for extracting burr from a complete row of pieces
 - A group for handling the burr-gripping hands
 - A group for the burr rotation and unloading

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ADVANTAGES THAT CAN BE OBTAINED WITH THE USE OF MECHANICAL GRIPPING HANDS (PLIERS) AND MULTIPLE HEADS

- 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.
- INCREASE OF THE QUANTITY OF PRESSED MATTER PRODUCED IN THE TIME UNIT because it is possible to carry out the piece extraction in masked time, that is with closed press during vulcanization, so increasing the number of pressed matters produced in the time unit.
- CARRY OUT AN ACCURATE EXTRACTION of complex and difficult pieces, such as curved rubber sleeves for household appliances without affecting the overall cycle time because this operation is carried out outside the press in masked time, that is during the vulcanization phase;

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- CARRY OUT the finishing (burr removal) on the machine edge without affecting the overall cycle time because this operation is carried out outside the press in masked time, that is during the vulcanization phase;
- REDUCE THE COST of the extraction heads. In fact, the head is built with a minimum number of adequate grips for the extraction of a single row of pieces and is then used also to extract the pieces that are located in the other rows on the same male supporting bar and on the other bars of the same mould;
- REDUCE TOOLING TIME at every change of production because it is possible to position several extraction heads in the same island, whose use can be selected by digiting the reference code in the man/machine dialogue terminal;
- CARRY OUT the control operations of the external quality of manufactured articles and sealing controls within the island.