RUBBER INJECTOR matched to a compression machine for membrane production

RUBBER INJECTION UNITS:

are used to convert compression presses to injection presses or a single-colour injection process to a two-colour operation. These injection units operate with a separate screw and piston system. In this process, the preplastification and injection operations are performed separately. This greatly improves dosage precision, control and thermal consistency as well as cycle reproducibility. Plastification is performed by means of a special profile screw that ensures the homogeneity of the plasticized. Loading back pressure values and screw turns can be adjusted. It is possible to inject 20-100.000 cc. of moulding compound at an injection pressure ranging from 1000 to 2000 bar.

1 General description

This machine is used for the injection pressing of flat elastomer membranes for expansion tanks.
The machine is composed of an injection group, which plasticizes and heats the material to be injected into the closed moulds and to be kept at a high pressure and temperature to allow the material reticulation. After a defined, adjustable time the press opens and the bottom die exits on the front side of the press.
At the end of the table-exit operation the manipulator comes down, strips the burr and extracts the pieces.
After the pieces have been removed the table reenters and the manipulator deposits the pressed pieces, onto a special container after removing burr.
The burr and machining scrap at the end of each press opening are made to fall in a special container placed on the sliding table in the frontal area to the bottom dies.
At the end of a number of pre-set, adjustable cycles the container can be replaced with an empty one.
The machine is composed of:

- A used 400 T-type vertical press with a cylinder closing from the bottom
- A separated screw and piston injection group placed in the rear part of the press and connected to the block by means of thermo-regulated channels
- A two-nozzles block with thermo-regulated channel connected to the upper fixed head of the press
- A sliding table for the bottom die exit
- A manipulator placed on the front side of the press for burr removal and the extraction of pressed pieces
- Three water-operated thermo-conditioners for thermo-regulating the plasticization screw for the injection chamber and the block with thermo-regulated channels
- An oleodynamic gearcase for moving the press and the injector
- An electrical control panel to control the press manipulator injector
- A push-button panel
- Two heating tables for mould heating. Temperature control is performed by two thermo-regulators fitted on the front side of the electrical control panel
- A pneumatic system.

2 Description of the operation principle

The elastomeric material to be processed comes in max 50mm wide strips with a thickness of 5 mm. The strip is inserted by the operator into the extruder lead-in placed on the upper side. Through the Archimedean screw rotation the material is pushed into the injection chamber until it reaches the loading volume corresponding to the volume of pieces to be pressed plus the scraps. During the loading step the material is pre-heated and plasticized.
In the injection chamber the material is kept at a safety temperature of approx. 60°-80°C so as to avoid vulcanization. From the Injection chamber the material is pushed through the injection channels obtained in the mould, or through a thermo-regulated block with several injection nozzles directly into the cavities of the closed mould.

After the reticulation time (vulcanization) has elapsed the press opens vertically downwards.
At the end of the opening run the sliding table comes out with the bottom die showing the two semi-cavities of the pieces.
At the end of the table exit run the manipulator descends for the first time to pinch the burr of the piece's profile in four points.
At the end of the pinching operation the manipulator goes up again, so stripping the burr.
At the end of the ascending run the manipulator comes down again to go and pinch the membrane at the central feedhead points. At the end of the low pressure pinching operation of the feedhead air is blown to the centre of each membrane so causing the feedhead to break away from the dies.
After the breakaway the manipulator ascends again by means of its main cylinder.
At the end of the upward run the sliding table with the bottom die reenters into the press to start a new closing and injection cycle, while outside the manipulator descends again with its main cylinder.
At the end of the descent run the two side cylinders keep running downwards until they tidily deposit the membrane onto a container and pile it up for a pre-defined, adjustable number of cycles.
At the end of the vertical descent run the membranes are separated from the manipulator and the feedhead is cut by a special blade placed on the central gripping pliers.
At the end of the feedhead cutting operation the manipulator and the side pistons ascend again with the feedhead scrap and the machining burr to reach the high starting position. The machining scrap with the feedhead are withheld up to the next partial exit of the bottom table.
With the table partially out, the manipulator releases the scrap onto a special container placed on the front side of the table.
After a short pause the table comes out completely to allow the cycle to be repeated.
At the end of a predefined, adjustable cycle the membranes are to be removed by the operator.
This operation is possible only if the operator has inserted the mechanical block chute and opened the bottom mobile protection gate.

3 TECHNICAL FEATURES OF THE MACHINE

Mould closing strength	KN 400° KN
Mobile table run	30mm
Minimum thickness of the mould	???mm
Size of the heating table	70x900mm
Power installed on the tables	0,8+10,8 kw
Theoretical injection capacity	1500cc
Punch diameter	68mm
Diameter of the plasticizing screw	50mm
Pressure on the material	1400 Kg/cm2
Plasticizing screw speed	g/1' 0/100
Power for thermo-conditioners	10.5 Kw
Number of thermo-conditioner areas	3
Pump delivery	l 1' 52.33+220
Working pressure	200 Kg/cm2
Pump engine power (20 HP)	18.5 Kw
Total power installed	Kw 50.6
- Engine revs	g/1' 1470
- Press weight	\ 8000
- Injector weight	1000 Kg
- Manipulator weight	200 Kg
- Total weight	9200 kg
- Room temperature limits	0-40 °C
- Thermo-regulation fluid	water
- Heat exchanger capacity, 50°C oil gearbox with 15°C cooling water	Kcal 10.000-13.000
Consumption with 15 °C water	l/1 1
Minimum pressure	2 bars
- Capacity of the heat exchanger thermo-conditioners with 60 °C fluid with 15°C cooling water	Kcal 7.000 x3 areas
Consumption with 15 °C water	l/1min 16.6x³ areas
Exchangers total consumption Oil gearbox and thermo-conditioners	l/1min 6¸
Voltage	V 380

INJECTORS USE ADVANTAGES:

- REDUCE THE TIME FOR PREPARATION OF raw material to be inserted into the mould c into the transfer pot.
- REDUCE THE OPEN MACHINE CYCLE TIME for loading of raw material, in that cavity l directly carried out by the injector.
- REDUCE THE VULCANIZATION TIME by four times approximately, in that material arrive mould cavities after being preliminarily heated into the extruder, the injection pot and d passage into the injection runners.
- REDUCE THE TIME FOR MOULDED ITEM QUALITY CONTROL thanks to the high c moulding parameters, consistent production is guaranteed.
- FLASHES AND RUBBER WASTE ARE REDUCED thanks to the film formed between tl cavities. Furthermore, making use of platens with could runner system a higher reduction i due to the mould feeding runners, can be achieved.
- REDUCE SCRAPPING FROM THE OPERATOR, thanks to increase accuracy in parameters.
- REDUCE MANUAL LABOUR COSTS in the moulding stage since several machines controlled by a single operator. In case of totally automated cycles, one operator can control line of machines.
- REDUCE THE ENERGY COST REQUIRED for preparation of raws and finishingof moulded
- REDUCE THE NUMBER OF MOULDS AND EQUIPMENTS required for production of quantity of items produced in the time unit.
- REDUCE THE INVESTMENT COST with respect to the investment required for a press o new injection presses.
- REDUCE THE TIME FOR RETURN OF INVESTMENT.