

ELECTRIC SYSTEM

The electric control box is equipped with:

- A) Siemens/Telemecanique power elements
- B) Electronics for control of the process:

1. Data monitoring and control station
2. Programmed logic (PLC) for sequential control of machine
3. Control cards for injection process parameters.

The microprocessor/operator interface consists of:

- A VGA video with 16 shades of gray (green phosphors)
- Oilproof/shockproof keyboard for industrial environments.

The software for control and data monitoring is composed of:

- Configuration machine, e.g. work shifts, turning on and off the machine, etc (for use by the operator)
- alarms
- data functions (data and moulding parameters storage, and their re-programming).

HYDRAULIC SYSTEM

The hydraulic system has been designed to guarantee maximum energy efficiency, minimum oil overheating and electric safety.

The system includes:

- variable displacement axial piston pumps with load sensing;
- thermostat equipped with solenoid valve for regulating oil temperature and electric safety device;
- high filtering capacity filters with electric control;
- oil level indicator with electric safety device for pump stop at minimum level;
- feedback proportional valves to control injection pressure.

SPECIFICATIONS

INSTALLED POWER		8 ST.	14 ST.	18 ST.	24 ST.
INJECTOR HEATING	kW	18 + 12	18	18 + 18	18 + 18
MOULD-HOLDER HEATING	kW	28	50,4	63	84
INJECTOR MOTORS	kW	22	22	22 + 22	22 + 22
ANC. EQUIPM. MOTORS	kW	15	15	15+ 7,5	15 + 7,5
TOTAL INSTALLED POWER	kW	95	105,4	165,5	186,5
AVERAGE CONSUMPTION					
ELECTRIC ENERGY	kW/h	48	46	80	95
AIR (7 bar)	Nl/min.	300	300	300	300
REFRIGERATION UNITS	frig/h	-	24000	21000	35000
WEIGHT					
NET WEIGHT	kg	18000	27000	41400	47700

Technical characteristics are indicative. Machines may undergo modifications and/or variations without previous notice.



PROTECTIONS AND SAFETY DEVICES

Protections and safety devices are all realized as per EEC standards. They may be ordered to comply with the standards of the country of destination.



MAIN GROUP

SERIES STAR



AUTOMATIC ROTARY MACHINES

FOR DIRECT INJECTION ON UPPER OF SINGLE- AND DUAL- DENSITY RUBBER SOLES

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Main Group Technologies srl

Via Newton, 1 - 30036 - S. Maria Sala - VENICE - ITALY - ph. +62 812 5000 289 - info@atom.co.id - www.atom.co.id

SERIES STAR

An innovative machine series utilizing the **INCOM PROCESS® Main Group patented system** of injection-deposit and compression.
Thanks to this system it is possible to realize, with one only single process, a compact rubber outsole and an expanded rubber midsole (up to a specific weight of 0.6).

MACHINE MODELS

MACHINE MOD.	NUMBER OF STATIONS	MOULD/STATIONS	ROFLEX®
STAR/08	8	1/2 PAIR/ST.	●
STAR 197	12 - 14	1/2 PAIR/ST.	
STAR 297	18 - 24	1/2 PAIR/ST.	

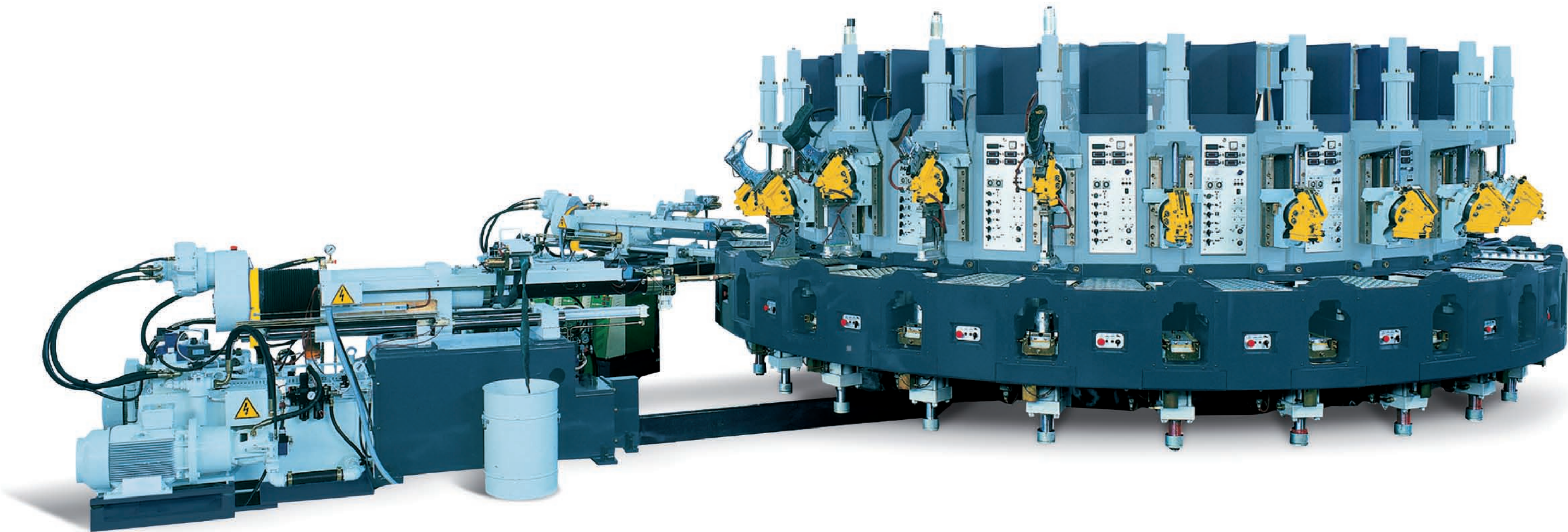
PRODUCT TECHNOLOGY

The manufacturers of footwear on a worldwide level try to make shoes comfortable, long-lasting, resistant to abrasion and breaking, flexible, provided with characteristics of antistatic resistance, at low and high temperatures and with a stable warehouse life. Two density rubber is the only material possessing all these qualities.
Thanks to its thermosetting characteristic, rubber has long been used by manufacturers for its intrinsic stability.
Nonetheless, it has been found difficult to use the vulcanization system in an efficient production activity, given the considerable use of manpower

and the complex treatment required in processing rubber.
The STAR series machines and INCOM PROCESS®, patented in 1992, have facilitated the utilization of rubber for injection and no longer for vulcanization.
Shoes produced in this way are much more comfortable than the traditional shoes in hard or thermoplastic rubber. They are light, durable and cushion impacts to a greater extent. This makes them extremely interesting for the military sector and safety applications, for work and leisure time.

PRODUCT DESIGN

Considering the accurate dispersion of the material into the mould, it is possible to obtain complex patterns and extremely thin sections which were previously difficult or impossible to produce.



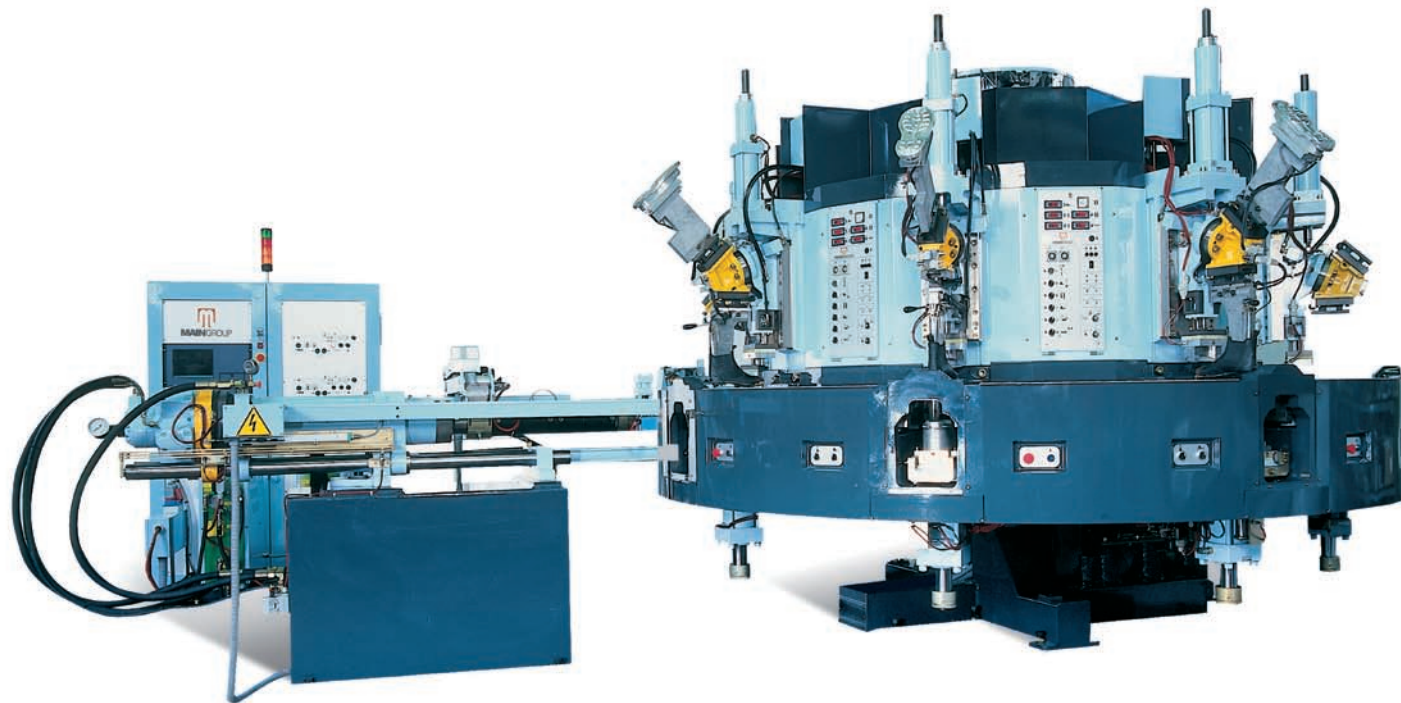
SERIES
STAR 297 - 24

SERIES **STAR**

The 8-station version has been pointed out as optimum in the investment/production ratio since it allows:

- the use of 4 pairs of two-color moulds (thus limited investment in the moulds as well)
- employment of one only operator
- production of 20-25 pair/h. in the case of 360" vulcanization time.

The performance of this version is seen to be optimum in case **plastic lasts** are used, with the consequent combination of the machine with an ASSEMBLY LINE, opportunely studied, making it possible to carry out all the operations on the shoe outside the machine.



STAR 08

CHARACTERISTICS

- High reliability and efficiency, in conformity with EEC safety standard
- Simple, rapid injection system
- High yield thanks to rapid injection
- Computerized identification of each station and relative pre-set moulding parameters
- Storage of moulding data to ensure a rapid setting and replacement of moulds
- Moulding parameters: volume, pressure, graded injection and temperature control
- Selection of mould parameters totally independent in every station
- PLC for electronic programming in each station
- Calculation of production and self-diagnostic information constantly displayed during operation of machine
- Adjustable rotation time
- The entire hydraulic system guarantees uniform, decisive movements

ADVANTAGES

Accurate deposit of rubber

Thanks to the "INCOM PROCESS®" system, the rubber is deposited directly on the base of the sole. With 5 different speed/volume steps, a precise distribution of the rubber is obtained with different properties in the variously involved areas.

Excellent control of compression pressure

The ability to produce outside toe-caps and counters proves the excellent control of the compression pressure and the exact positioning of the rubber carried out by the machine.

Notable capacity

Thanks to a large injection volume and to the variable screw loading speed, the rubber is well plasticized. The injectors operate at a lower than maximum capacity, guaranteeing the operation of the machine within its possibilities.

Heavy closing pressure on ring (mould-holder structure)

The hydraulic closing pressure on the rings allows the use of great quantities of viscous rubber which

- The entire hydraulic system is classified "ES Energy Saving"
- 3 oil-heated zones per injector in order to ensure an accurate thermal control
- Regulation of the speed of sole piston upstroke and sole pressure reducer
- A sliding, movable part of the bottom allows easy insertion of logo on the base of the sole
- A rapid replacement of moulds is possible thanks to the rapid fastening of the rings and to the sliding movable part of the bottom
- The outside toe-cap and counter are injectable at the same time as the midsole
- Automatic degassing available
- The configuration of the outside sole may be either shell-shaped or flat
- Standard robot interface

could be needed to obtain tall, narrow profiles, e.g. for outside toe-caps or counters.

Dimensions of mould-holder

The large dimensions of the mould-holder make it possible to produce large-sized shoes, leaving a good closing surface of the mould around the cavity of the sole and thus guaranteeing improved distribution of heat for the vulcanization.

Short injection sequence

The injection-deposit sequence ensures rapid operation, outstanding yield and the possibility of a quick rotation, with consequent short cycle times.

MACHINE TECHNOLOGY

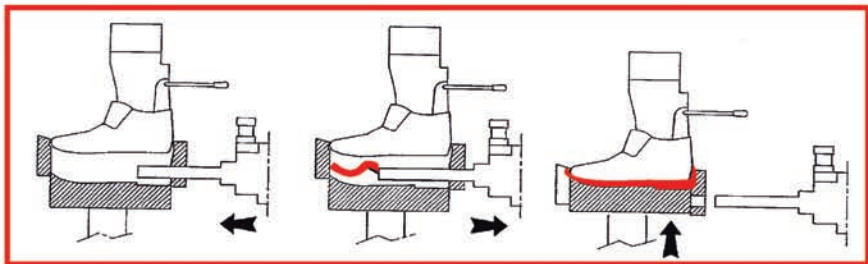
STAR machines are extremely automated and use the most advanced technology. They are easily interfaced with any trimming, cementing and/or roughing robot, or with all the automated line conveyor systems for finishing or moulding. The machine is entirely under computerized control. A central Phase 5 Siemens PLC unit (Process Logic Control) manages the machine operations. The PLC unit links the 24 PLC systems, one in each station of the machine. Given that the moulding operation of the STAR machine is carried out without high pressure, more economic moulds can be used in aluminum eventually instead of processed steel. Thanks to the precise control of the deposited volume of the INCOM PROCESS® - system that performs a rapid mould change which allows pre-heating the mould before being mounted

MOULDING PRINCIPLE

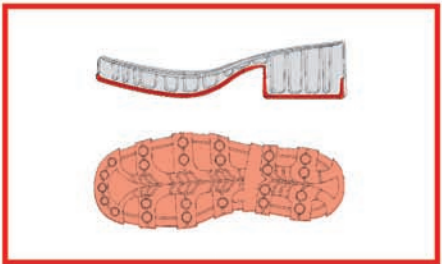
- The injection nozzle enters directly into the cavity of the mould
- The nozzle is withdrawn from the mould simultaneously with the injection phase, determining a deposit of rubber in a quantity proportional to the design of the sole
- At the end of the injection, the mould piston is

on the machine so that, at the moment of fitting in the mould-holder, the mould already has the proper temperature, ready to be injected - the loss of material is reduced to a minimum and production costs are further reduced. The substantial clamping forces and the high injection pressures required in the past for rubber moulding are no longer necessary with the INCOM PROCESS® resulting in energy saving and an improved environmental impact. The machine produces less waste, consumes less oil and its energy consumption is lower than the traditional vulcanization systems.

- raised, compressing the rubber
- The system makes it possible to inject very hard rubber
 - The thickness can be extremely fine
 - There is no waste of material since there are no sprues.



Descriptive drawing of the process that can be indifferently used for injection on uppers and soles.



An example of two-color/two-density sole and two-color/two-density sole injected on uppers.

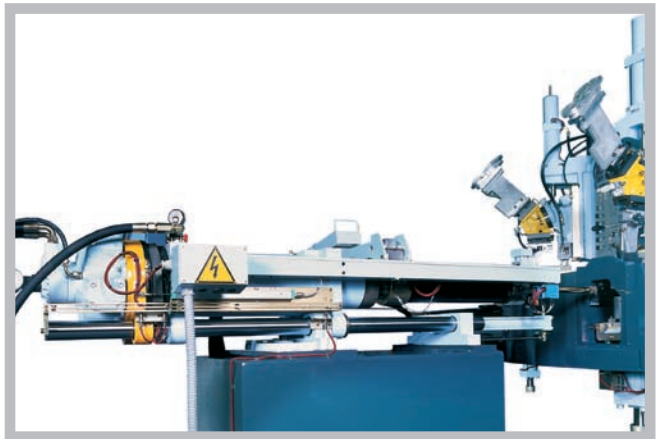
MOULD-HOLDER UNIT

- Rapid mould fastening
- Modular spheroidal cast iron structure
- Each mould-holder is a separate unit, complete with all functional elements, fastened to the rotary table and controlled by a PLC
- The movement of last is controlled by a direct hydraulic cylinder featuring stroke adjustment by means of micrometric threaded ring
- The movement of rings is adjusted by means of hydraulic cylinders
- The movement of sole mould is controlled by a direct hydraulic cylinder with double stroke adjusting function. This cylinder is supplied with speed regulators and one pressure reducing valve with relevant pressure gauge
- Rings and pistons are equipped with autonomous heating systems cylindrical resistance heating)
- 5 thermoregulators fitted on each mould-holder panel



INJECTION UNIT

- Internally thermoregulated piston-screw type complete with hydraulic motor and reducer
- Plasticator thermoregulated by fluid circulating unit
- Fluid-thermoregulated nozzle
- Automatic rubber band feeding system with double safety device



- for controlling 2 rings, the sole piston, and 2 lasts (toe-cap thermoregulator is an optional feature). The bottom and rings are heat insulated
- Each station has a double volumetric regulation, one for last A and one for last B
 - Each mould-holder is provided with a special cycle for dosing and compacting of the rubber, in addition to a timer for control of vulcanization time
 - Each mould-holder can have up to ten work cycles.

SPECIFICATIONS

CLAMPING FORCE		
LAST	kN	74
BOTTOM	kN	150 max.
RING	kN	74
TOE-CAP	kN	15 (opt.)
STROKE		
LAST	mm	200
BOTTOM	mm	100
RING	mm	65 + 65
HEATING		
LAST W 250 + 300	W	250 + 300
DUMMY LAST W 160 - 200	W	160 - 200
MOULD		
LENGTH	mm	430
WIDTH	mm	202

- Automatic system for quick plasticator cooling to be enabled when work cycle is completed
- Thermostatic units are controlled by machine microprocessor
- Speed and pressure are electronically adjusted.

SPECIFICATIONS

INJECTION UNIT		
SCREW DIAMETER	mm	65/45
SCREW L/D RATIO	-	14/14
AVERAGE LOADING CAPACITY	gr./sec.	38/24
INJECTION VOLUME	cm³	930/445
INJECTION PRESSURE	bar	1520/2000
INJECTION SPEED	cm³/sec.	200/84
SCREW SPEED	r.p.m.	0÷95/0÷125
SCREW TORQUE	daNm	275/176
HEATING ZONES	N°	3/2



A Main Group trademark that certifies the flexibility of the rotary machines based on preset parameters. The STAR machine is ROFLEX® certified in the 8 - station version.



IT IS A PROCESS WHICH PERMITS:

- Rapid change of mould
- Self-adjustment of the injection parameters
- Less waste of material
- Utilization of existing moulds
- Pre-heating of mould
- Great maneuvering facility (using non-skilled personnel)
- Security for operators