

The electrostatics of freshly injected plastic mouldings



Problem solutions by means of compressed air assisted HAUG Ionization systems

Electrostatic problems with all their associated consequences start at the time of demoulding. They are multifaceted and endure from the creation of the part right through to its final use.

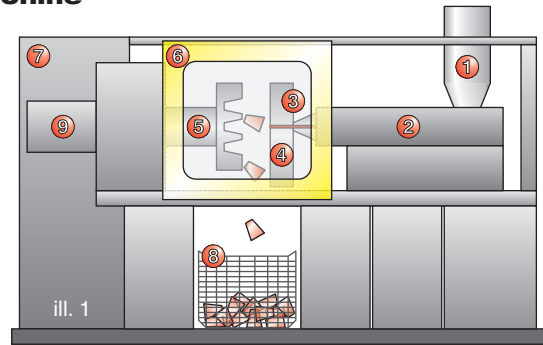
Where?	Problem	Solution	Ionization system
During demoulding	During demoulding, the parts stick to the injection mould or the ejector due to their electrostatic charge. They will not drop out of the mould, and when the mould closes again, the part will be squeezed and therefore destroyed; in some cases, the mould gets damaged as well. Light, small parts made of insulating plastics are particularly susceptible to this problem.	An air gate which is attached above the injection mould or to its side emits a jet of compressed air across the tools while the mould is open and the parts are ejected (see ill.2)	Air gate KL VS
During removal using a handling system	When the part is to be deposited at a defined position on a conveyor belt, or fed to a packaging or an additional processing step, a gripper or suction cup is used to remove the part from the mould. These grippers or suction cups are located at the end of a robot arm, the handling system. If the mouldings have hardly any weight of their own, they stick to the gripper and will drop off uncontrolled in a random location.	When the mould opens, only one side of the part can be seen, while the other side still rests in the mould. The visible side can be discharged first. A light stream of ionized air with a pressure of some 0.3 to 2 bar will suffice, depending on the distance between the air outlet and the part(s). The handling system then removes the parts. The remaining charge on the previously covered side now becomes evident. A further air gate is therefore installed somewhere transverse to the path of the handling system. The parts are turned so that the charged side faces the air gate; they pass the air gate and are then completely discharged (see ill. 4)	Air gate KL VS EI VS air assisted LS PLE
Following demoulding, ejection	When the charged parts are pushed out of the mould by the ejectors and actually manage to get out, the danger is not over yet. They may get stuck to other machine parts underneath the mould during their fall onto the conveyor belt, or they may remain stuck to a collecting container. After a short period, the machine interior will be clogged up with sticking parts.	An air gate above the injection mould emits an ionized jet of compressed air between the open mould halves after the parts have dropped out. (see ill.2)	Air gate KL VS
On the conveyor belt	The conveyor belt is intended to ensure that the parts are fed without damage from the machine into the collecting containers. If they stick to the belt due to their charges, they will travel continuously on the belt. The electrostatics and therefore the adhesive force are reduced over time. The parts will then usually drop to the floor (see ill.3).	An air gate is installed above the belt at the location where the parts are intended to drop into the collecting boxes. The emitted air jet should blow past the belt tangentially. Part of the air should impact on the belt while the rest should flow into the collecting container. The air pressure should be set higher of the parts need to be separated from the belt (see ill.3)	Air gate KL VS EI VS air assisted LS PLE
In the collecting container	Each individual part contributes a small charge to the collecting container; this charge does not have any disturbing effect at first. But many hundreds or perhaps even thousands of parts whose charges have accumulated to produce a kind of capacitor, "radiate" an intensive field. The parts get stuck on the inner wall of the container. In addition, they attract dust and particles present in the ambient air. Anybody getting too close to this charged box will act as lightning conductor.	An air gate blows a light jet of ionized air into the container. In order to keep the charge level in the container as low as possible, low air pressure can be used. The air pressure level must be set so that a slight flow of the ionized air is still felt at the bottom of the collecting container.	Air gate KL VS EI VS air assisted LS PLE
During further processing	Electrostatic forces attract particles which then contaminate the surface. During printing, painting, coating, metallization or use in sensitive systems, this contamination results in surface defects or malfunctions.	The surface of the parts must be discharged completely with ionized air. Then always protect from contamination.	Air gate KL VS EI VS air assisted LS PLE

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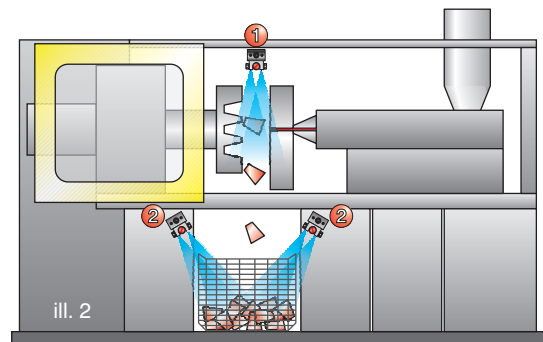
Simplified diagram of an injection moulding machine

- ① Granulate feeder
- ② Melted granulate
- ③ Injection nozzle
- ④ Fixed mould side
- ⑤ Movable mould side
- ⑥ Sliding door as access protection
- ⑦ Switch cabinet, control system
- ⑧ Freshly moulded plastic parts in the collecting container
- ⑨ Hydraulic cylinder



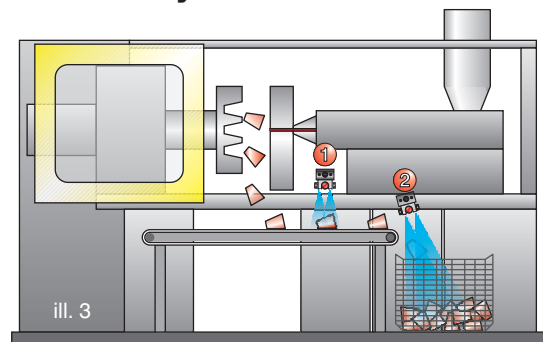
Potential installation positions for parts ejection in collecting container below mould

- ① Above the mould
- ② Below the mould, above the edge of the collecting container, blowing from one or two sides



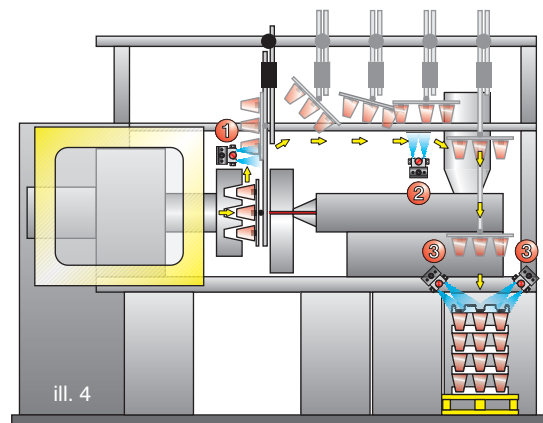
Potential installation positions for parts ejection to a conveyor belt

- ① Directly above the conveyor belt air gate KL VS
- ② At the end of the conveyor belt tangentially past the belt curvature blowing into the collecting container



Potential installation positions for parts removal by means of a handling system with deposition in pallets in defined positions

- ① Above the mould, transverse to the vertical stroke, discharge of the first side of the parts
- ② Alternative positioning, transverse to the horizontal conveying path
- ③ Discharge of the second side of the part after depositing



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