



# PRODUCTION

## Plasma Coating Technology for Injection Molding Tools

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Release agents are indispensable auxiliary substances used in plastics die-casting and injection molding, and are used to prevent bonding of the mold with the injection-molded part during the demolding process. Injection molding tools get special life-prolonging treatment with Plasmatrete's PT-Release® — a semi-permanent release coating applicable to a wide variety of tool materials (metals, ceramics, fiber-reinforced plastics, glass etc.) using atmospheric-pressure plasma. This coating is one of several that belong to the range of coatings which are applied with the Openair®-PlasmaPlus® system. This new Plasmatrete release coating technology has been patented worldwide.

### Reducing Adhesion

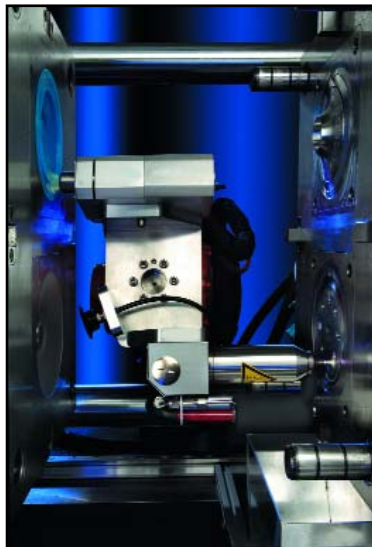
PT-Release coatings can effectively prevent accretions in injection molding tools, prolonging the service life up of the tool up to the next touch-up of the PT-Release coatings. The coatings also protect the injection molding tool against corrosion. The pore-free layer structure forms a barrier against corrosive attack and thereby appreciably increases the service life of the tool.

### Naked-Eye Visible

PT-Release coatings are visible to the naked eye because they produce interference colors. Because of this, the operating technician sees a highly visible, good coating on the tool providing a simple means of quality assurance.

### Environmentally Friendly

The coatings are applied solvent-free. Any byproducts are non-toxic and may be released to the environment without fur-



*Integration of the PT-Release coating system in an injection molding machine for a) activation of the plastic part's surface (top: Openair plasma jet) and b) applying the universal release coating to the injection molding tool (bottom: PT-Release jet).*

ther cleaning. The coating need not be removed before the recycling process, since the coating is such a thin film and non-toxic.

In actual use, the coating exhibits excellent release properties for the most varied injection molding materials on a polymer and caoutchouc (latex or natural rubber) base. The characteristic coating properties are readily achieved with film thicknesses of <100nm, so that even nanostructured injection-molded parts can be produced.

### Open-Air Plasma

In the PT-Release coating process, the highly energetically excited Openair plasma is admixed with a chemical compound which cross-links as a firmly adhering semi-permanent release coating on the mold surface. This coating can be regularly regenerated fully automatically within a few minutes after a defined number of demolding processes — thus totally eliminating manual application with all of its disadvantages. Because of its particular thermal stability and its long-lasting release effect, PT-Release surpasses conventional release agents on a tenside, resin or fluoropolymer base. The injection molding tool is immediately ready for re-use after the application, since no airing or repolishing of the release coating is needed. This dramatically reduces machine downtimes, and numerous injection-molded parts can be demolded between the individual application cycles. In the case of 1K polyurethane foam, for example, as many as several hundred demoldings are possible up to the next touch-up of the release coating.

The PT-Release coating is a silicone-free, universally applicable mold release agent with excellent sliding properties that is capable of effectively preventing accretions of the most

varied materials (polyurethane foams, polyester and epoxy resins, etc.) in the injection molding tool. The release coating is to be applied at places where silicones are undesirable or where post-treatment of the surfaces of the injection-molded parts is necessary.

There are no disturbing release agent remainders left on the injection-molded parts so that they can be subjected to painting, printing, metalizing or bonding immediately after demolding

with no need for previous cleaning of the surfaces of these parts.

The strong release effect of the PT-Release coating system is in effect at very thin film thicknesses (<100nm) — and even after repeated applications, the coating does not increase in thickness in the injection mold. This feature is especially important for the production of nanostructured surfaces of injection-molded parts. Such high-grade, optically functional surfaces can, for

example, suppress light reflection on glasses, cell phone displays and instrument covers (moth eye effect). Moreover, the accretion of contaminants (lotus effect) can be reduced substantially, as will the haptics or matting of switching and operating elements.

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