

# THE CLEANING OF PLASTIC PARTS AFTER LAPPING PROCESSES

Vallotech, a company located in Vallorbe (Switzerland), is a subcontractor to the automotive industry that produces cast polymer parts in phenoplast used for automobile fuel pumps.



Amsonic cleaning system EgaClean 4200

After the lapping process, these parts are soiled with mineral oil, petroleum, particles and additives. The parts geometry and the high drag in of soiling require a cleaning process that is efficient and constant in quality. The company's previous water-based cleaning machine produced a high volume of efflu-

ent because the detergent was always rapidly saturated with oil. This multi tank cleaning unit was replaced by an EgaClean 4200, an A3 solvent cleaning system (isoparaffin, non-halogenated solvent) by Amsonic.

## Machine capacity

The EgaClean 4200 features the following technical specifications (CE and ATEX conformity):

External dimensions W x D x H	2560 x 1435 x 2050 mm
Volume of solvent	700 litres
Distillation capacity	120 l/h
Installed power	54 kW
Basket dimensions	670 x 480 x 320 mm
Maximum basket weight	100 kg
Cleaning functions	Ultrasonics, flooding, filtration 1 µm
Emissions: solvent vapour	approx. 3 kg/year
Disposal of the distillation sump	Is burnt in cement factories

Machine specifications

### The standard cleaning programme consists of the following process steps:

- Working tank (precleaning) Ultrasonics  
Micro filtration
- Clean tank (distillate) Ultrasonics  
Flooding
- Vapour phase
- Drying
- Cycle time approx. 14 min.

The solvent is heated to approx. 65°C under vacuum (100 mbar).

The movement of the cleaning baskets is programmable (oscillating, rotating or static).

### Economic efficiency and environmental protection

In principle, the solvent is not replaced periodically. Distillation losses amount to approx. 5 - 10% of the oil drag in.

Operational costs per year	€
Solvent 300 litres at approx. 3.00 €/l	1'020
Energy 20 kWh x 1800 h x 0.10 €/kWh	3'600
Maintenance (single shift operation)	500
Spare parts	1'500
<b>Total</b>	<b>6'620</b>

## Presentation

In comparison with cleaning machines based on chlorinated solvents, the Amsonic EgaClean features an outstanding ecological balance. The A3 technology has therefore managed to achieve a broad market share and is an alternative to cleaning with per- or trichloroethylene.

The complete recycling of the solvent guarantees a constant cleaning quality and a high economic efficiency of the process. This technology is also applied to clean parts prior to galvanic processes such as PVD and CVD coating.

All types of class A3 solvents can be utilised in the EgaClean. Isoparaffin is applied in case of soiling by mineral oil. In the electronics industry, however, modified alcohols are applied because of their optimal suitability for the cleaning of printed circuit boards after soldering processes.

**With regards to cleaning quality, the following values can be achieved:**

Quality criterion	Water-based cleaning system CleanLine	A3 solvent based cleaning system EgaClean
Surface tension in Nm/m	>65	<45
Particle soiling in $\mu\text{m}$	<50	<150
Carbon content in $\text{mg}/\text{m}^2$	2	13
Residual film (C) in Nm	Not measurable	10

To conclude, it should be said that, cleaning technologies have to be applied systematically. Water-based cleaning processes are particularly suitable for the removal of polar soilings and in cases of low oil drag in. They assure a very high degree of cleanliness. If the material to be cleaned is subject to corrosion, certain precautions have to be taken in connection with this cleaning method, e.g. corrosion inhibitors have to be used in detergents and rinsing tanks.

Nonpolar soilings, e.g. cutting oils, are preferably to be removed with A3 solvent based processes. This technology is nontoxic and offers a good protection against corrosion. Consequently, there is no universally valid cleaning solution and the coaction of soiling and material has to be reviewed carefully before choosing the one or the other technology.

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