

Surface Functionalisation of Three-dimensional Plastic Parts

Robot-controlled functionalisation by electron treatment



Challenges:

- Non-polar plastic parts have a low surface energy
- Adhesion problems during printing, coating or bonding without prior activation
- Flame treatment requires a lot of energy, has high CO₂ emissions, has high temperature influence and leads sometimes to non-uniform activation
- Handling of highly explosive fuel gases (methane, butane, propane)

Solution

- Precise energy input by electron treatment for uniform, reproducible and long-term stable surface functionalisation
- Simultaneously higher product speeds, lower temperature input and higher sustainability

Advantages over flame treatment

- Higher surface energies
- Long-term stable functionalisation
- No use of highly explosive fuel gases
- Low temperature process
- Significant reduction of energy consumption (by ~ 55 %)
- No additional emission of CO₂ (reduction of 4.7 ... 5.6 g/m²)
- High throughput

Flame treatment:

- Formation of reactive species
- Reaction with polymer molecules
- Enhanced temperature
- Short-term stable functionalisation

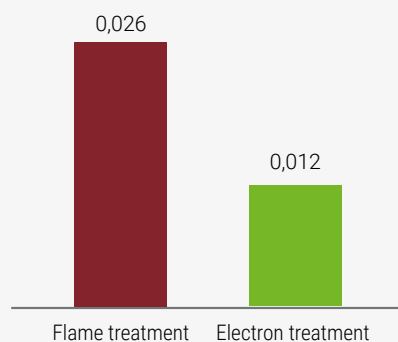


Electron treatment:

- Formation of air plasma
- Reaction with polymer radicals
- Minimum temperature increase
- Long-term stable functionalisation



Energy consumption [kWh/m²]:



CO₂-release [g/m²]:

