

Basic analysis for the hardening of powder lacquer with help of NIR-radiation

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The legislative influence of environmental protection and the additional requirements to the emission control are worldwide the driving forces for the development of environmentally compatible lacquer technologies. There we need to research new concepts, to advance and to technologically translate, so that the pollution by emission in air, water and soil, the hazardous potential of the used or freed basic commodities, the use of basic commodities and the energy demand are minimized. In the context of an integral accounting at the present solutions of this problem next to high-solids and water mainly powder lacquer to a use.

Even so the powder lacquer technology is one the most environmental friendly lacquer procedure, it still hasn't reached the expected market share. Mainly it is the combination of high elevated stoving temperatures and long stoving times at the chemical interlacing thermal hardening powder lacquer that concludes to the inevitable denial of powder lacquer technology.

This dissertation was therefore, in view of a solution to the problems the NIR-technology visualized and researched. It is a new kind of heat transfer process through radiation, with high power density and penetration depth of the offered radiation extremely short curing process at the surface coating with minimal substrate heating achieved.

The influence of the attainable coating quality was researched through different process parameters quantified. Also the impact of miscellaneous materials and material parameters for the reduction of stoving time was researched.

The knowledge of the spectral absorption-, transmission- and reflexion- performance of powder lacquer and substrate as well as the irradiation strength of the radiation source is for the forecast respectively computation of stoving time of powder lacquer of great impact.

As for the direct calculation of the stoving time for powder lacquer no analytical gage is available at this point of time, this part had to be described with help of a model.

With assistance of the newly invented model and the accompanying evaluation software satisfying results of the simulation where obtained.