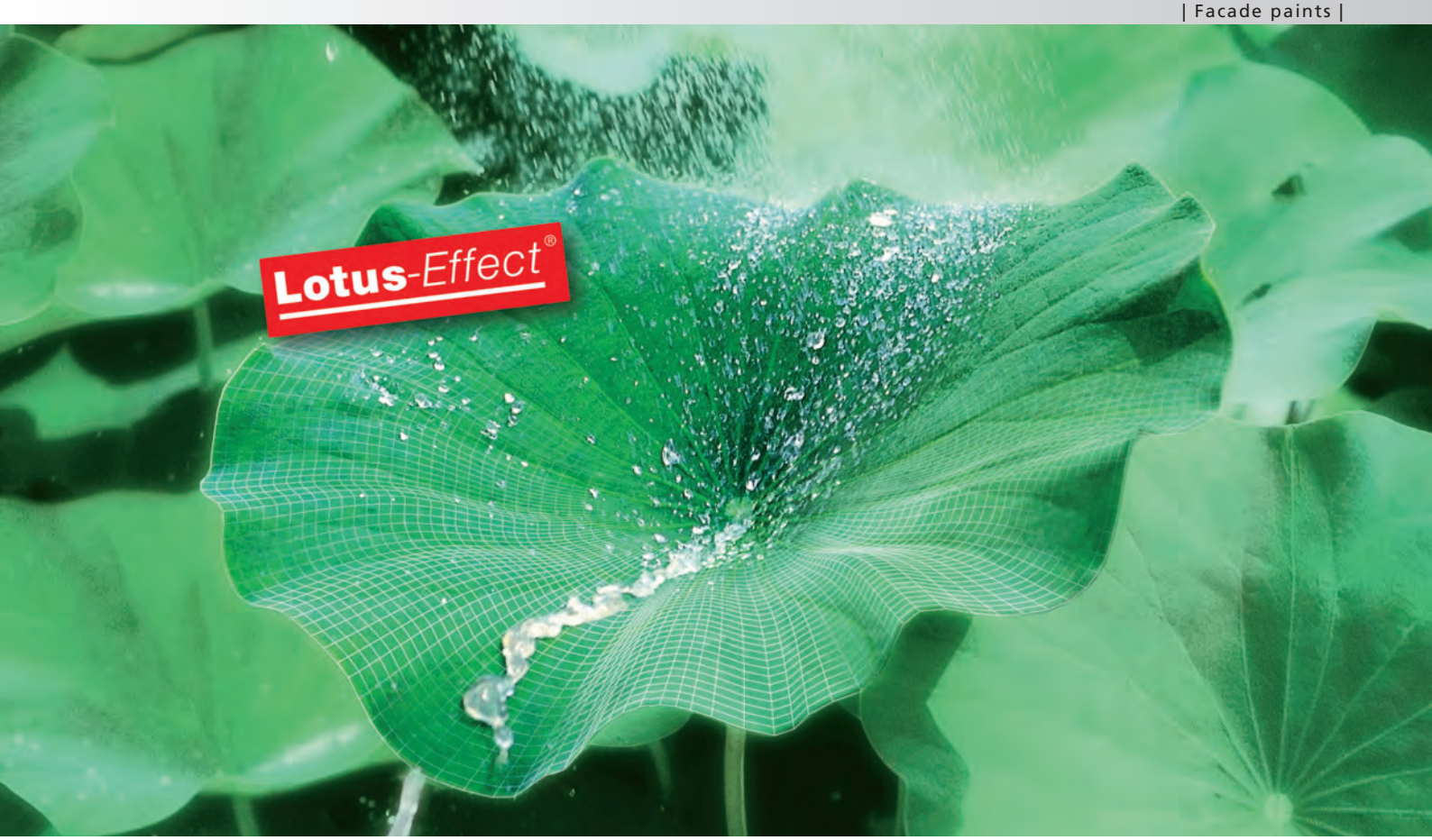



# StoLotusan

Facade coatings
with **Lotus-*Effect*®** Technology

# StoLotusan

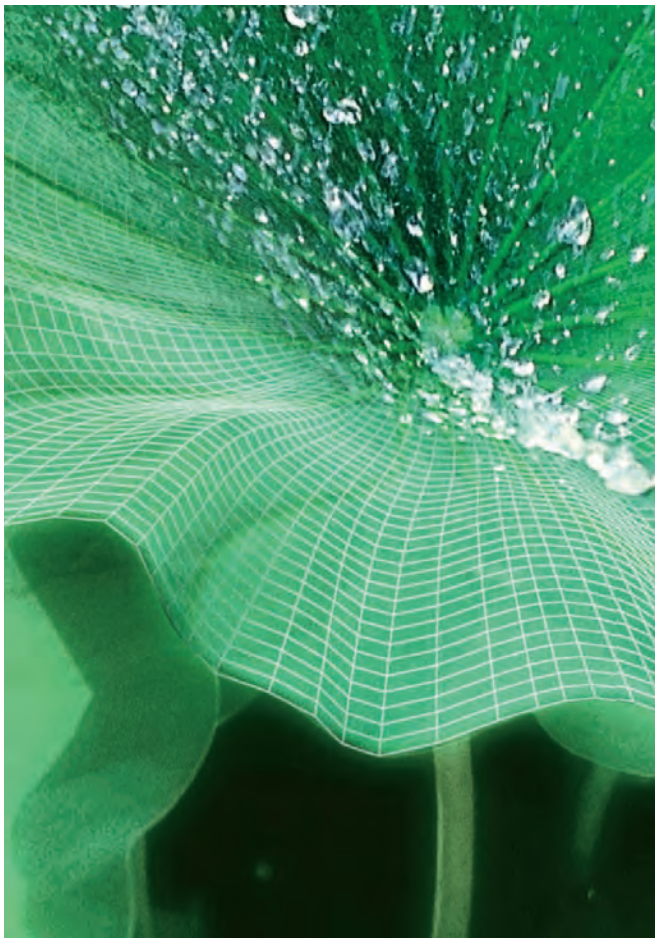
## Bionics: Technology inspired by nature

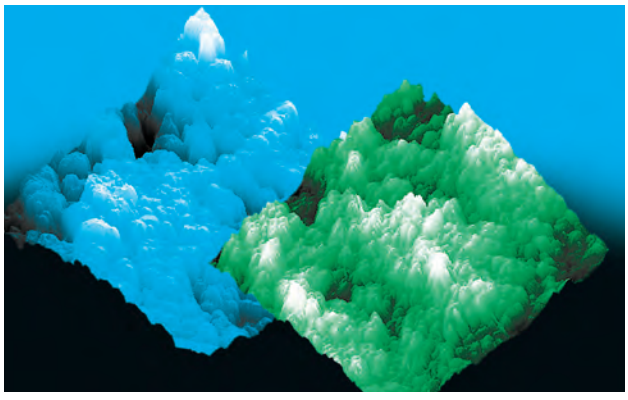
**Bionics is a relatively new scientific discipline that researches biological and technological compatibility and also examines the principles of natural compositions. This know-how is then subsequently transferred to technological applications.**

**Why use the lotus leaf as a model?**
The permanently clean lotus leaf has always fascinated researchers and engineers. After a rain shower the leaves of a lotus plant always look dry and freshly cleaned. The process involved is naturally extremely interesting with regard to the development of new products – especially for a render and paint manufacturer like Sto.

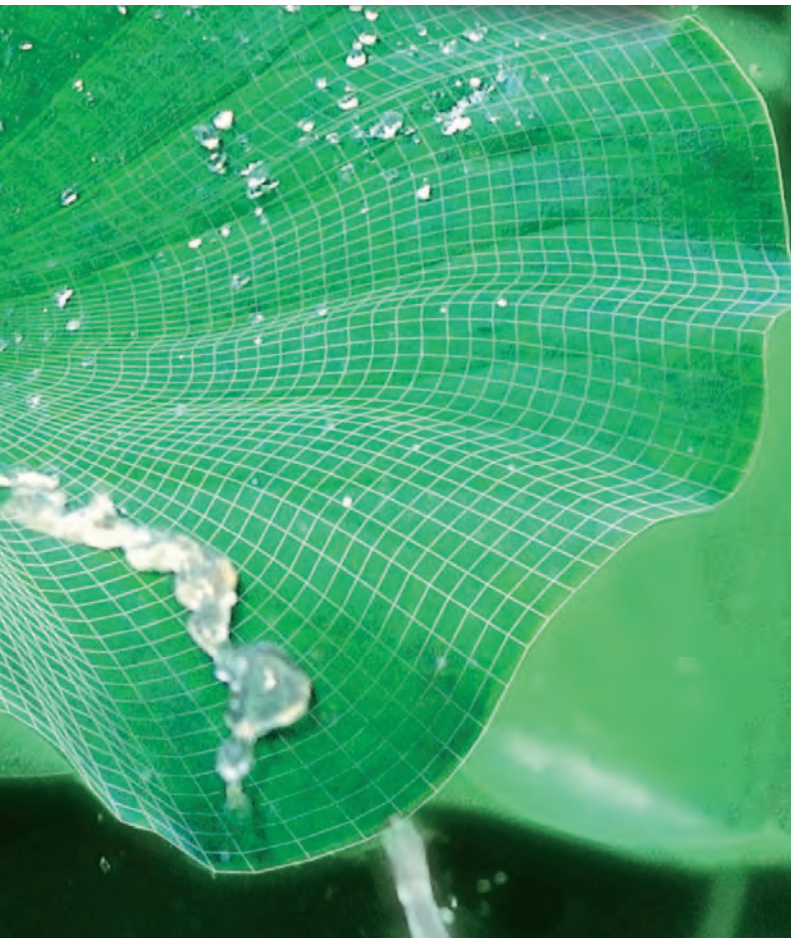
**How is the lotus leaf able to clean itself?**
Smooth, polished surfaces with a high level of water repellency – such as freshly-waxed car paintwork – were viewed as resembling the lotus leaf the most; however, it turns out that a different principle has asserted itself in nature. Under the microscope it is apparent that the surface of the leaf has a finely nubbed, almost rough character. In conjunction with its tremendous water repellency, the microstructure – which is imperceptible to the naked eye – creates an astounding effect: dirt particles only cling loosely to the highest points of the microstructure and do not rest entirely on the surface. As a result, the surface tension of raindrops is enough to remove these particles from the structure and to simply carry them off the surface of the leaf with each raindrop.
The leaf effectively cleans itself in a wholly natural way as **dirt simply runs off with the rain.**

iQ INTELLIGENT TECHNOLOGY





A view through an electron microscope: left, the surface of the lotus leaf, and right, the technically-engineered surface of StoLotusan.



**How does the Lotus-*Effect*® Technology work technically?**
Two attributes make a coating a **Lotus-*Effect*®** Technology facade coating: firstly, extreme water repellency, which is achieved by using specially selected raw materials and binder combinations; and secondly, a microstructure composed of very fine mineral rock flour and metal oxides.

This simple-sounding formulation, which nevertheless required great effort to create and implement, enabled the lotus leaf principle to be transferred from biology to technology for the first time ever: dirt runs off with the rain – a claim that now also applies to facade paints. Essentially, this is one of the most impressive examples of successful bionics to date.

Beautiful, clean, reliable and as smart as nature:
facades coated with Lotusan offer long-term appeal for house owners.

# Lotusan facade coatings with Lotus-*Effect*® Technology

## Dirt runs off with the rain

**House owners are always happy if they can be spared dirty facades for as long as possible. However, the sides exposed to weathering will be particularly severely affected over time: moisture and deposits of dirt provide the ideal breeding ground for microorganisms such as algae and fungi.**

However, dirt deposits can be significantly reduced using the facade paint StoLotusan Color and facade render StoLotusan K/MP. For here too, the **Lotus-*Effect*®** Technology – a clever combination of a water-repellent surface and a special microstructure – works in a similar way as on the lotus leaf. As a consequence, the majority of dirt particles fail to adhere properly to the facade surface and are simply washed off by the raindrops during the next rain shower.

The problem with conventional facades is that soiling becomes more and more visible over time. Above all, dirt deposits and moisture on the structurally unprotected weather sides provide an ideal breeding ground for microorganisms.

| The benefits at a glance | |
|---|---|
| **General** | • Extremely high level of water and dirt repellency after drying<br>• Maximum resistance to soiling, high self-cleaning capacity<br>• Excellent weathering and chalking resistance, UV-stable<br>• Excellent $CO_2$ and water vapour permeability (diffusion-open)<br>• Matt, microtextured surface<br>• Available in white and numerous StoColor System colour shades |
| **Safety and reliability** | • StoLotusan surfaces stay clean in comparison with other facade coatings<br>• Excellent building physical values<br>• Dry system structure offers protection against microorganisms<br>• StoLotusan Color G / StoLotusan K/MP: film conservation provides additional protection<br>• Successfully quality-tested by renowned testing facilities (e.g. Fraunhofer Institute for Building Physics)<br>• Easy to overcoat |
| **Cost-effective** | • Longer refurbishment intervals<br>• Sustainable facade coating<br>• Saves valuable resources |
| **Ecology** | • Lotusan (without use of film-conserving biocides!) provides enhanced, natural protection against algae and fungal attack through elimination of breeding grounds, above all on the weather-exposed sides<br>• "Ecologically intelligent" product |
| **Innovation** | • Pioneering technology<br>• Pace-setting product in the bionics research field |

**The result:**
Optimum facade protection as the facade remains dry and pristine for longer.

## How facade coatings work

### Conventional facade coatings

Dirt particles form a deposit on the surface.

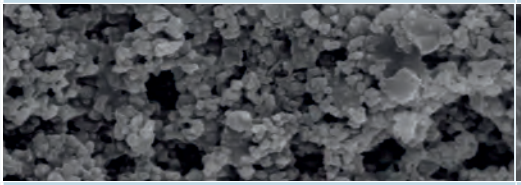
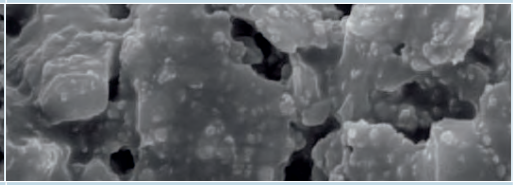
The surface is only minimally hydrophobic. Water and dirt particles cling to it.

### Dual features of facade coatings with Lotus-*Effect*® Technology

**Feature 1:** Lotusan is microtextured. The contact area for dirt particles and water is therefore significantly reduced.

**Feature 2:** Lotusan is also extremely hydrophobic. Raindrops run off straight away and simply take the loosely attached dirt particles with them.

## Properties comparison: StoLotusan Color - siliconised paint

| | | |
|---|---|---|
| **Description** | **Lotusan Paint**<br>**Lotus-*Effect*® Technology Paint**<br>microtextured, water-repellent coating | **low-grade silicone resin paint**<br>water-repellent coating |
| **SEM image** |  |  |
| **Building physical values** | **Water vapour diffusion sd value:**<br>0.01 m, class V1<br>**Water permeability w value:**<br>0.05 kg/m² √ h, class W3<br>**Raindrop contact angle:**<br>> 140°<br><br>• Highly non-wettable by rainwater<br>• Reduced level of dirt adhesion thanks to microtexture<br><br>*In the case of sustained exposure to moisture, the drip-off effect is not continuously maintained, but is fully restored after drying. | **Water vapour diffusion sd value:**<br>> 0.14 m, class V2<br>**Water permeability w value:**<br>< 0.05 kg/m² √ h, class W3<br>**Raindrop contact angle:**<br>approx. 110°<br><br>• Water-repellent<br>• Diffusion-open<br>• Cost-efficient |

Dirt particles have little chance thanks to the micro-textured surface.

# Lotusan & Sto External Wall Insulation Systems

## A clean solution for refurbishment and new build projects

**Thanks to their innovative product features, Lotusan facade coatings are suitable for both refurbishment and new buildings. In combination with energy-efficient Sto External Wall Insulation Systems, they always make optimally insulated facades look good – and for significantly longer than conventional top coats.**

### Well worth it: energy saving plus long-term structural protection

Lotusan provides building owners and architects with genuine all-round products for facade protection and design. Compared to other facade coatings Lotusan surfaces stay clean for longer.

If a building facade requires refurbishment in terms of render or paint, the installation of a Sto External Wall Insulation System with optimum insulation thickness should also be taken into consideration. Calculated over a period of years, the energy costs saved will well outweigh the sum invested. But it is not only the energy-saving effect that pays off: a Sto External Wall Insulation System also provides long-term structural protection – especially in combination with Lotusan coatings.

### Technical data

| | |
|---|---|
| **Facade paint Lotusan Color** | • Water vapour diffusion Mass flow density V: 2100 (determined with a layer thickness of 200µ)<br>• Water vapour diffusion sd value: 0.01 m (determined with a layer thickness of 200µ)<br>• Water vapour permeability rate w value: 0.05 kg/(m2.√h)<br>• Contact angle: 140°<br>• Highly non-wettable by rainwater*<br>• Coating does not swell upon water impact |
| **Facade render Lotusan K 2.0** | • Water vapour diffusion sd value: 0.05 m Water permeability rate w value: 0.02 kg/(m2.√h)<br>• Contact angle: 140°<br>• Highly non-wettable by rainwater*<br>• Coating does not swell upon water impact |
| **Important note** | • The excellent water vapour diffusion and water permeability values have been confirmed by the FPL test report from the Research Institute for Pigments and Coatings (FPL e.V.) at Stuttgart University.<br>• Test reports comprehensively confirm the functionality of Lotusan products |

* In the case of sustained exposure to moisture, the drip-off effect is not continuously maintained, but is fully restored after drying.

**Facade render StoLotusan K/MP**
Top innovation in the render sector: with StoLotusan K/MP, Sto has succeeded in transferring the **Lotus-***Effect*® Technology to a facade render for the first time ever. The result is a finishing render for exterior use offering excellent properties in terms of application, building physics and facade protection.


**StoLotusan Color facade paint**
The **Lotus-***Effect*® Technology enhances the natural cleaning effect: dirt runs off with the rain.
The film conservation properties of StoLotusan Color G (with additional protection against microorganisms) provide optimum protection even on heavily weathered facades. Since 1999, the product has well and truly proved itself in practice on many millions of square metres of facades throughout the world. StoLotusan Color is ideal for coating old and new exterior render substrates.

## Overview of Lotusan product benefits

| | Lotusan Color | Lotusan G | StoLotusan K | StoColor Maxicryl |
|---|---|---|---|---|
| **Stipulated feature / stress factor** | | | | |
| Plinth areas | ● | ● | ● | ●● |
| Horizontally weathered surfaces/cornices | | | | ● |
| Weathered facade | ●● | ●● | ●● | ●● |
| Non-weathered facade | | | | ●● |
| Water run-off effect | ●● | ●● | ●● | ● |
| **Lotus-*Effect*®** Technology | ●● | ●● | ● | |
| Dust exposure | ●● | ●● | ● | ● |
| Oily fine particles (soot) | ● | ● | ● | ● |
| Intensive colour shades | ● | ● | ● | ●● |
| Dark colour shades; lightness value less than 20% | ● | ● | ● | ●● |
| Microtextured surface | ●● | ●● | ● | ● |
| Prevents algae and fungal attack | ● | ●● | ● | ● |
| Refurbishment of algae and fungal attack | ● | ●● | ● | ● |
| Anti-graffiti | | | | |
| Low sd value; water vapour | ●● | ●● | ●● | ● |
| Low w value; water | ●● | ●● | ●● | ●● |
| Low sd value $CO_2$-permeability | ●● | ●● | ● | ● |
| Reinforced concrete | ● | ● | ● | ●● |
| Minimum susceptibility to chalking | ●● | ●● | ● | ●● |
| Public areas | ● | ● | ● | ●● |
| Ceiling soffits | ● | ● | ● | ●● |
| Without film conservation | ●● | | | |
| Colour feasibility/selection | ● | ● | ● | ●● |

●● very good ● good ● to a limited extent

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