



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?

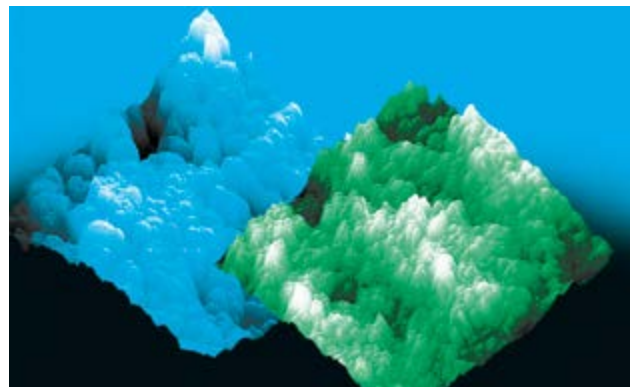
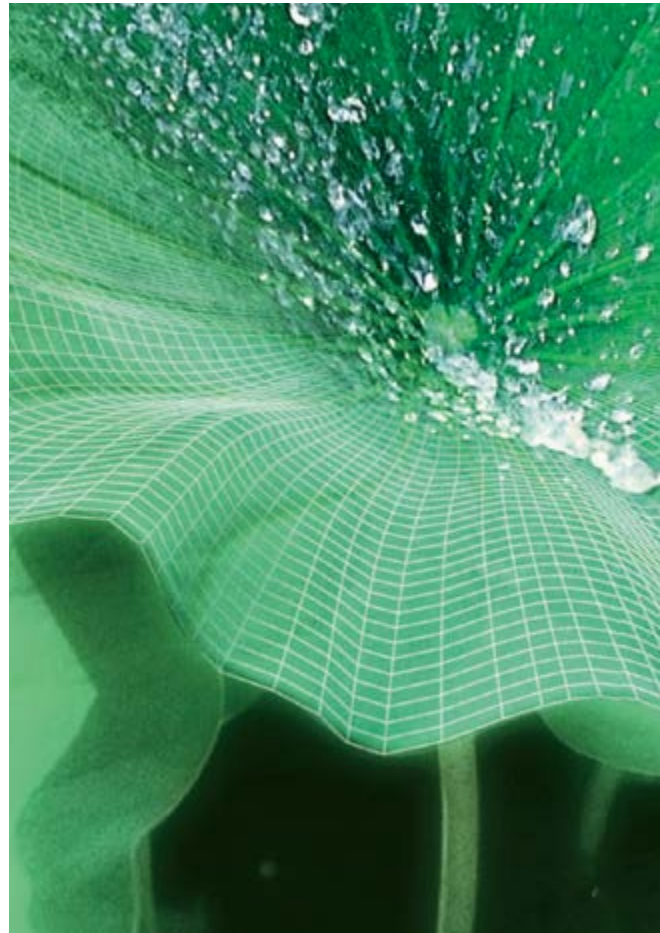
Smooth, polished surfaces with a high level of water repellency – such as freshly-waxed car paintwork – were viewed as resembling the lotus leaf the most; however, it turns out that a different principle has asserted itself in nature. Under the microscope it is apparent that the surface of the

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.**



Sto has been conducting intensive research in the field of bionics for many years. The result: facade paint with iQ – Intelligent Technology where innovative surface functions provide clear added value.



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 micro-organisms.

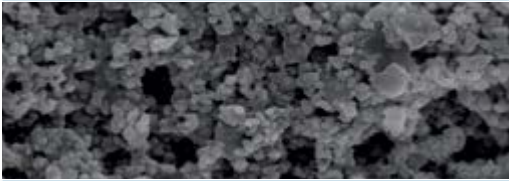

The benefits at a glance

General	<ul style="list-style-type: none"> • Extremely high level of water and dirt repellency after drying • Maximum resistance to soiling, high self-cleaning capacity • Excellent weathering and chalking resistance, UV-stable • Excellent CO₂ and water vapour permeability (diffusion-open) • Matt, microtextured surface • Available in white and numerous StoColor System colour shades
Safety and reliability	<ul style="list-style-type: none"> • StoLotusan surfaces stay clean in comparison with other facade coatings • Excellent building physical values • Dry system structure offers protection against microorganisms • StoLotusan Color G / StoLotusan K/MP: film conservation provides additional protection • Successfully quality-tested by renowned testing facilities (e.g. Fraunhofer Institute for Building Physics) • Easy to overcoat
Cost-effective	<ul style="list-style-type: none"> • Longer refurbishment intervals • Sustainable facade coating • Saves valuable resources
Ecology	<ul style="list-style-type: none"> • 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 • "Ecologically intelligent" product
Innovation	<ul style="list-style-type: none"> • Pioneering technology • 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		Dual features of facade coatings with Lotus-Effect® Technology	
			
Dirt particles form a deposit on the surface.	The surface is only minimally hydrophobic. Water and dirt particles cling to it.	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 - StoSilco Color - siliconised paint		
Description	Lotusan Paint Lotus-Effect® Technology Paint microtextured, water-repellent coating	low-grade silicone resin paint water-repellent coating
SEM image		
Building physical values	<p>Water vapour diffusion sd value: 0.01 m, class V1</p> <p>Water permeability w value: 0.05 kg/m² √ h, class W3</p> <p>Raindrop contact angle: > 140°</p> <ul style="list-style-type: none"> • Highly non-wettable by rainwater • Reduced level of dirt adhesion thanks to microtexture <p><small>*In the case of sustained exposure to moisture, the drip-off effect is not continuously maintained, but is fully restored after drying.</small></p>	<p>Water vapour diffusion sd value: > 0.14 m, class V2</p> <p>Water permeability w value: < 0.05 kg/m² √ h, class W3</p> <p>Raindrop contact angle: approx. 110°</p> <ul style="list-style-type: none"> • Water-repellent • Diffusion-open • Cost-efficient



Dirt particles have little chance thanks to the microtextured 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	<ul style="list-style-type: none">• Water vapour diffusion Mass flow density V: 2100 (determined with a layer thickness of 200µ)• Water vapour diffusion sd value: 0.01 m (determined with a layer thickness of 200µ)• Water vapour permeability rate w value: 0.05 kg/(m²·h)• Contact angle: 140°• Highly non-wettable by rainwater*• Coating does not swell upon water impact
Important note	<ul style="list-style-type: none">• 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.• 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.

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	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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