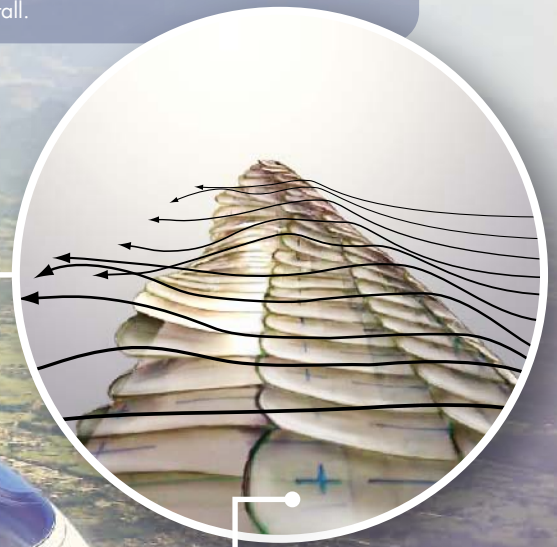
AEROFLEXIBLE AERODYNAMICS

SELFACTUATED WINGS FOR ADVANCED FLIGHT

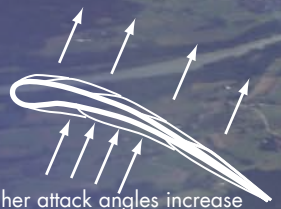
Independent and flexible elements form an enclosed surface which reshapes dynamically through aerodynamic effects. The air by itself forms the surface and without need of an active control system. This reduces drag, resonances and early stall.

Nature makes as well use of theses features. Feathers reshape the body dynamically or detach in critical situations to avoid stall.

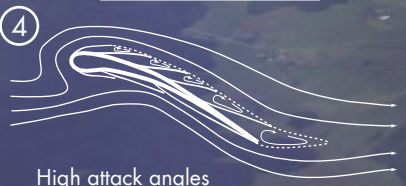


① Inertia effects in air create pressure potentials, which move the surface in shape

② Normal shape during travel. Shape has low pressure gradients.



③ Higher attack angles increase deflection of air and thus higher pressure gradients, caused by air inertia.

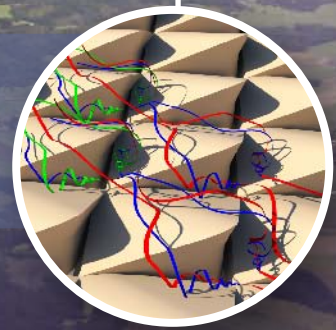


④ High attack angles enable elements to detach on the trailing edge, avoiding stall due reverse flow

Fine tures take advantage of lower friction of boundary layer turbulence, compared to laminar boundary layer. While giving the boundary layer an even grid of disturbance, which keeps the amplification of turbulences down. It also avoids the elements to flutter.

a) Golfball without dimples: *Strong boundary layer separation*

b) Golfball with dimples: *lower boundary layer separation*



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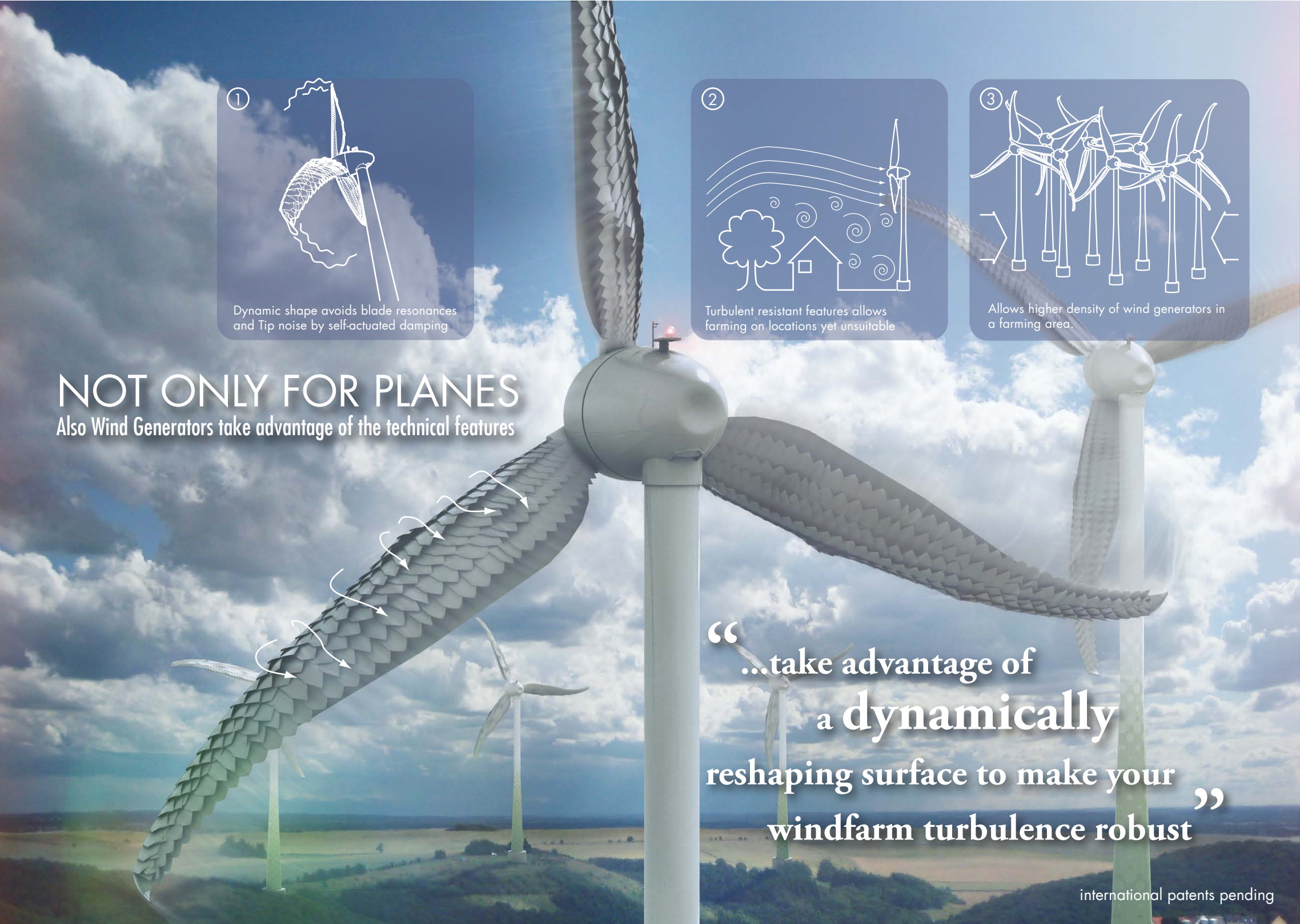

①
Dynamic shape avoids blade resonances and Tip noise by self-actuated damping
②
Turbulent resistant features allows farming on locations yet unsuitable
③
Allows higher density of wind generators in a farming area.
NOT ONLY FOR PLANES
Also Wind Generators take advantage of the technical features
“...take advantage of a dynamically reshaping surface to make your windfarm turbulence robust”
international patents pending

SAFER, ECO-FRIENDLY, HIGH PERFORMING.

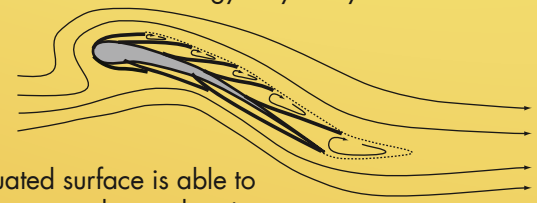
using Aeroflexible Airfoil on Planes allows:

- Higher flight dynamic due individual profile shaping.
- Self - lifting surface elements avoid early stalls in critical situations.
- Allows low speed flight without any compromise on high speed Flight.
- Ensuring lift during fast airborne slowdown before Landing.
- Temporary activated vortex generation uses kinetic Energy of vortices to increase lift in extreme situations.
- Individual surface morphing ability finds the optimal Aerodynamic body.
- Shaping an ideal Body avoids volume compensating boundary layer motion which reduces drag.
- Small and frequent structures on surface make use of the „sharkskin - effect", additionally reducing drag.
- No need of active regulating and steering units
- Robust against mechanic errors.
- Eco friendly due a more fuel saving travel
- Eco-Friendly to the environment requesting less infrastructure e.g. long landing strips

...Every Shape has its own aerodynamic Form

There are two reasons why bodies with different shapes in a fluid create different drag. One force which is equal for all shapes is the viscous surface friction. But the reason of shape related drag is purely mechanical! And it's about Newtons Law of Motion. When an inertial mass like air moves around a body it cannot change directions immediately. It has to be accelerated around. That's why you can observe the pressure around an object changes locally. Pressure gradients accelerate as contradictionary force creating lift or drag. But they also create unwanted Turbulence. This happens when the acceleration around an object is not steady so the stream collapses into a uncontrolled state of vortices which absorb energy and store them as angular momentum.

Most of the time this effect is unwanted because these vortices induce a higher Drag of the surface. They have a significant higher inertia compared to their environment. Due to the higher state of momentum and energy they carry.



A self-actuated surface is able to smooth out unsteady acceleration gradients caused by a non-ideal-aerodynamic shape and protects these areas from the uncontrolled creation of vortices.
Only in the critical situation e.g. during landing this airfoil takes advantage of the features of vortice's. momentum protecting the plane from stall.

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Felix Schaller wins Querdenker Award

About the Inventor:
Felix Schaller is an passionated graphics programmer since his teen age. Occupying himself with the realistic simulation of nature since the very beginning. After high school he studied Mechatronics but soon he figured out that this is not his destination. Continuing with a professional career as computer graphics programmer. During the past ten years occupying himself thoroughly with fluid dynamics, he figured out something odd in the declaration of fluid mechanics. Finally leading to the solution that actually every motion in fluids is perfectly describable with Newtons laws of motion, which even can describe lift and stall reasons on airplane wings. With these conclusions he developed the **Aeroflexible Airfoil** which makes use of these results leading into dynamically shaping wings using controlled vortex generation.
In Nov 2012 he was honored for his achievements with the **Querdenker Innovation Award** in the category „Inventor".

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