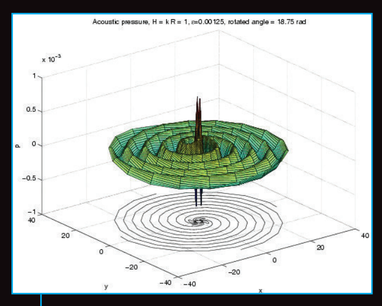
The Wind Egg:
Wind Egg Incubation Wind Tunnel



Acoustic pressure of sound generated by the Kirchhoff vortex.
Rendering: Bernhard Müller

Acoustic Vortex setup in L1 Wind Egg Incubation Chamber at von Karman Institute for Fluid Dynamics
Photo: Daniel van Hauten

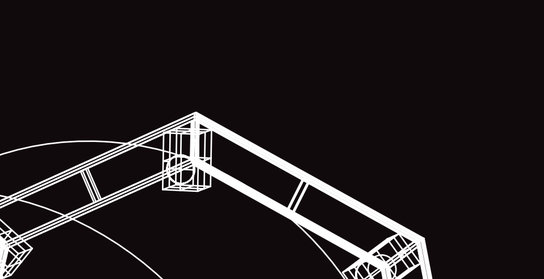
Acoustic Vortex setup in the exhibition Wird at at Harlan Levey Projects

Wind Egg in acoustic vortex setup in L1 Wind Egg Incubation Chamber at von Karman Institute for Fluid Dynamics.
Photo: Daniel van Hauten

Wind Egg in acoustic vortex setup in Wird Wind Egg Incubation Chamber at Harlan Levey Projects

Heartbeat sound recorded inside of fertilized wind egg by Yakut Cansev, VKI

Diagram of Fairing used in Wind Egg Experiment.
Courtesy of von Karman Institute



Beam forming microphone antenna at von Karman Institute for Fluid Dynamics.
Courtesy of Prof. Christophe Schram.

Just as chicken eggs need heat to be maintained after fertilization, so too do wind eggs need wind. In order to create the specific wind conditions needed to incubate wind eggs we use two speaker arrays to generate an acoustic vortex and its feedback loop. Sound is air moving, essentially a wind. The sound emitted perturbs the air in a specific way to create the very gentle wind needed to maintain fertilized wind eggs.

The wind eggs inseminated von Karman Institute's L2B Wind Tunnel two years prior while the experiment was based there (2013-16) are brought to the Wind Egg Incubation Wind Tunnel at M HKA. This experimental device was made with the support of Prof. Dr. Staf Van Tendeloo and his EMAT group for nano-fabrication at the University of Antwerp. Prof. Johan Verbeeck with the assistance of Giulio Guzzinati created the acoustic vortex array software. Sound designer Arzu Saglam and composer Marc Mahfoud created the sounds for the speaker arrays. The tunnel is an engineered silo by Spriomatic, who usually construct large-scale flour storage for industrial bakeries. The structures of the acoustic vortex arrays were fabricated by Roalt Zuidervaart.

Emission

Upstream, a six-speaker array creates the phenomenon of an acoustic vortex within the wind tunnel. Instead of a turbine or fan blades this wind tunnel relies on sound as propulsion. Sound derived from the call of a female vulture is processed by a custom made computer program. The program parses out the sound so it is emitted in a clockwise rotation through the six speakers. The sound from each speaker goes in and out of phase with the sound from the preceding speaker. This repeating sequence of phase-shifting creates a spiraling movement of sound down the length of the tunnel.

The center of all vortexes are "empty" or low pressure areas. Imagine the "quiet" eye of a hurricane which is defined by the clouds revolving around it. Similarly the center of the acoustic vortex is a quiet zone while it can be heard clearly near the walls of the tunnel.

Fertilized Wind Eggs

Two fertilized wind eggs are placed in the center of the tunnel. They are the subject of the spatial-acoustic setup. Each egg is emitting the sound created during wind insemination. The insemination process saw a wind egg placed in the test section of the von Karman's L2B Aeroacoustic Wind Tunnel. Wind carrying the sound of a mother vulture penetrated the eggs surface. The result sounds distinctly like a heartbeat — implying a successful insemination. From this moment it was carried directly to the L1 Wind Egg Incubation Chamber and those at the temporary Wind Egg facility at Harlan Levey Projects before arriving here.

Origins of the Form of the Wind Egg

The egg was originally a measuring device called a fairing. They were designed by von Karman Institute engineer Yakut Cansev and others to measure the amount of turbulence created within a wind tunnel turbine section.[1] The egg-shape of the fairing was chosen for its aerodynamic qualities. It would create the least amount of turbulence of its own while measuring turbulences around it. Wind could penetrate the fairing cum wind egg through a single hole. A microphone inside of the egg measured this wind. The Wind Egg experiment sought the exact same properties and adapted the fairing studies. The form has been reverse engineered and 3D printed by the artist.

1. "A remote microphone technique for aeroacoustic measurements in large wind tunnels" http://www. sciencedirect.com/science/article/pii/S0003682X1730806X

Feedback

The Wind Egg Incubation Chamber regulates and contains the special acoustic qualities within its walls. The sound emitted by the acoustic vortex speaker array is registered by a beam forming microphone array. It is essentially a camera for sound. The microphones covering is surface register the local position of sounds. While originally created by von Karman Institute engineers, the form has been reverse engineered 3D printed by the artist.

The sound of the acoustic vortex is registered and played back into the tunnel in realtime. This creates a type of feedback loop and ideally allows for the acoustic vortex to be self regulating, always adjusting for bodies and objects passing through the tunnel.

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