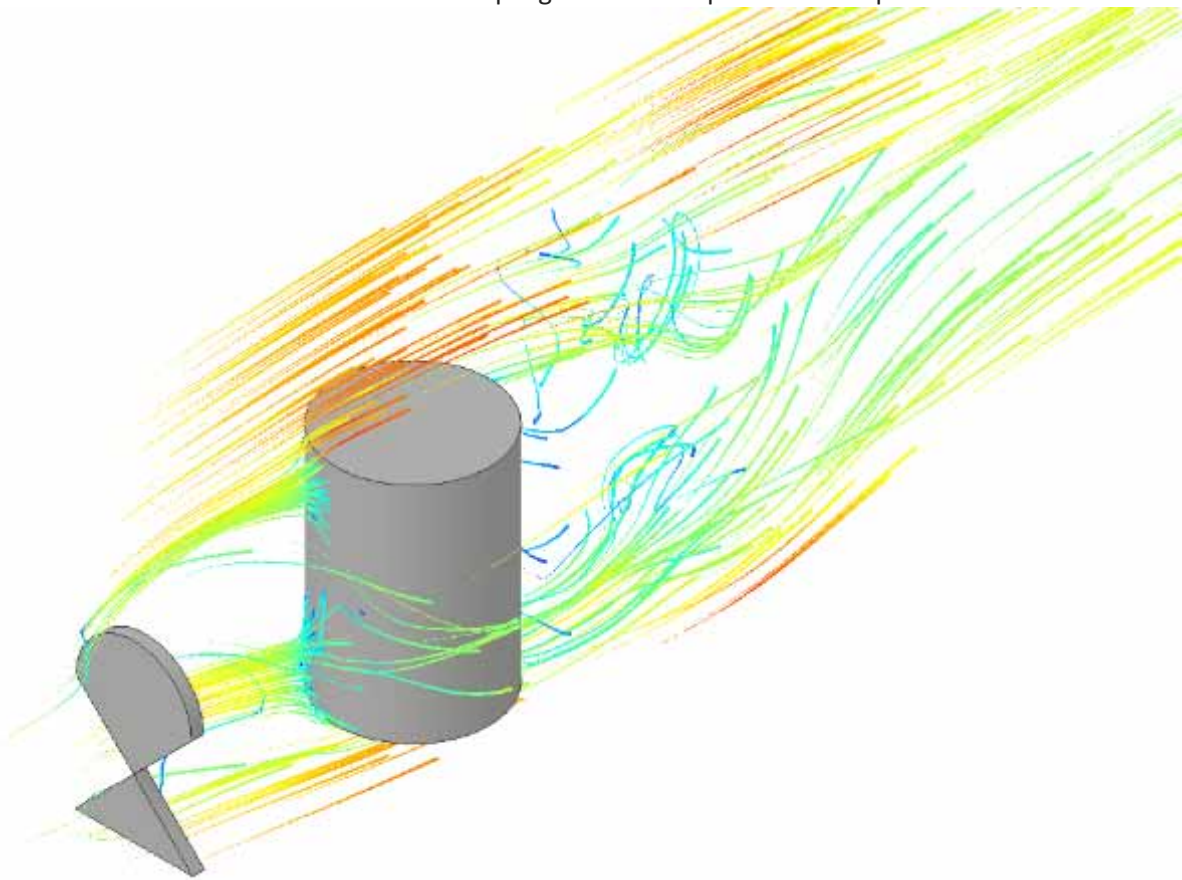


I have tried pushing the dry sand into molds adding Magic sand. A toy sand that is more sticky than normal sand. Again, I made a mixture with sand, but turned out to be too weak and too quickly disintegrated during or after testing in the wind tunnel. For the cement-sand mixture there was also the danger that it could fall apart, especially after molding. I could easily solve this by spraying the results with transparent spray paint and fixing the tests.

### *3.3 Controlling the Windflow*

During the tests I had done with the search for the right material, I tried to influence the wind current and its forms in various ways. During this process I also started using the Airflow software to predict the wind current. I started placing 3-dimensional objects in the software to see how the wind would respond to this. At this moment I found out that I was interested in the airflow behind the object instead of in front of it. So I came up with the idea to put an object in front of the object that I wanted to let the wind form. I saw how simple geometric shapes caused impressive wind currents.



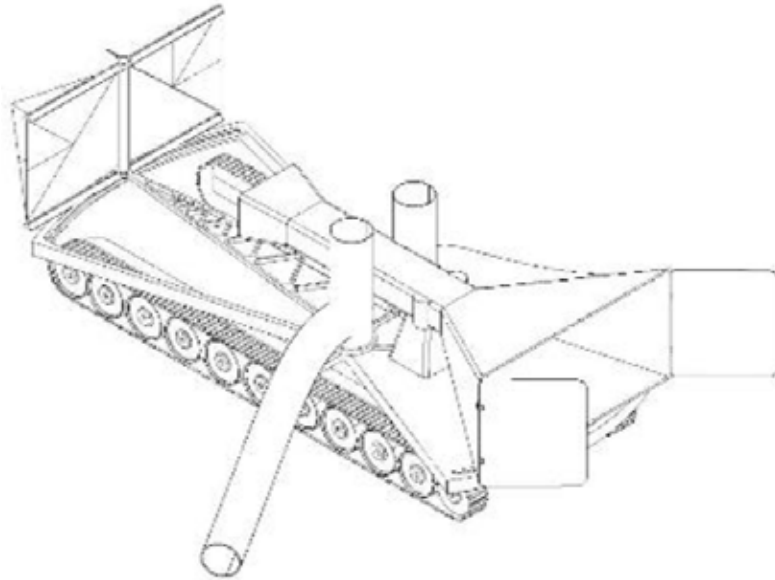
*(fig. 32 Airflow result)*

This fact appealed to me very much and I decided that I wanted to work with a limited number of geometric shapes, square, circle and triangle, and place them in the wind tunnel. This gave me the first 3-dimensional forms based on the movement of air from a high to a low pressure area around a 2-dimensional geometric surface. I have imposed the limitation on myself limit my influence on the wind. I was allowed to concentrate the wind, provide sand and lay the geometric shapes for the object to be formed. But I had to let the wind find its way past my blockades and form the object created and placed by me. I was curious if there would be similarities between the wind flows in the software and the physical objects.

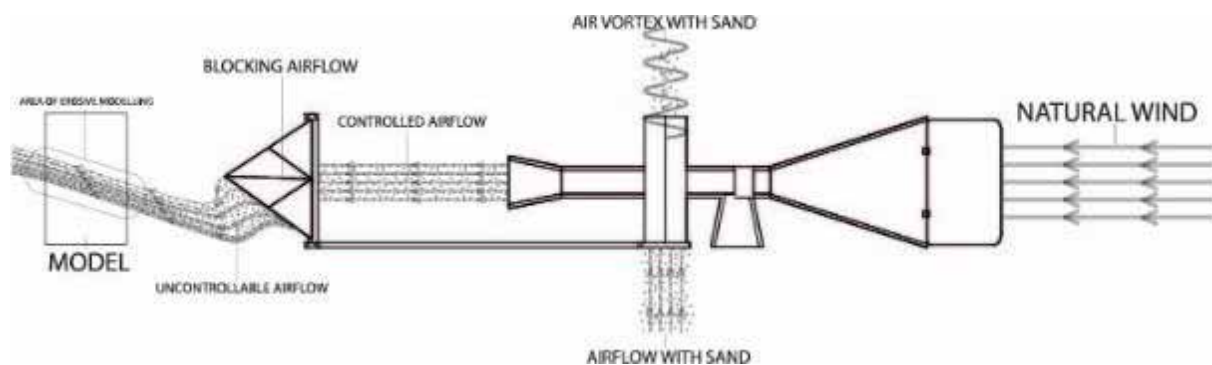
### 3.4 Improving Windmachine

After determining the right material, I decided to improve my partially paper wind turbine. The improved model had to solve a number of problems that I had discovered in my first version and also implement new insights on the basis of other wind turbines.

I started drawing the turbine to get a clear picture of how it could be built on a larger scale. Before I would focus on scale, I wanted to keep working in the current scale and print out my improved version for testing.



(fig. 32 Windmachine drawing)



(fig. 33 Windmachine 'how it works')

This improved model allowed more sand to slide into the turbine to speed up the wear process. In the previous model, there were often 'sand jams' in the machine. On the inside the tube was divided in two so that the wind could be compressed even more and could be distributed more evenly. In the previous model it was clearly visible that the air flow came out on one side of the tube. The new model was completely drawn in 3-d and could therefore easily be adjusted if necessary.

After 3 D-printing and mounting the improved parts in the turbine, I could start testing. This improved version had an inlet wind force of wind force 2 and could bring it to wind force 3 through adjustments in the design. In km / h the inlet was on average 12.2 and exhaust averaged 16.5 km / h. I applied the same method of partially controlling the wind flow by placing geometric surfaces in front of the airflow. This resulted in a collection of experiments of the process using all versions of the turbine.



*(fig. 34 testing in the windturbine)*

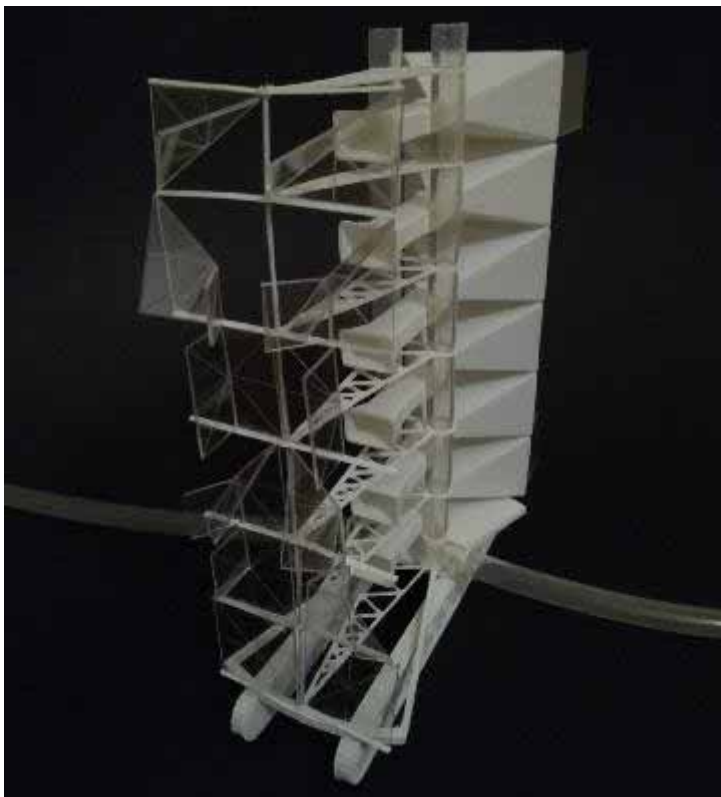


*(fig. 35 collection of experiments)*

These small models together present a form study of small sculptures. Although I found the small sculptures interesting as a result, I ran into a number of problems. Problems that could endanger my ultimate goal of working in the natural environment. One of the biggest problems turned out to be time in this phase. Each sculpture, with dimensions no larger than 5 by 5 centimeters, took in total about 1 to 2 hours of time. That, including the time I needed to find the right material at an earlier stage, put me in time crisis. For this reason, I have been unable to perform tests in the natural environment.

### 3.5 Future Application

In an effort to give my project more depth, I decided to take the project to a different level. I wanted to give my project a possible future application dealing with the consequences of climate change. Our earth today deals with, among other things, increasing deforestation and more extreme storms. Elements used in this project. Wind and sand, will be more extreme on our planet. Climate changes that also receive attention within the field of geo-engineering. The desire to change the climate with using of technology. I wanted to position this project in such a way that it could be an alternative in how we deal with these climate issues. This project would therefore be my version of geo-engineering. Not trying to change the weather with technology, but using the weather in its natural form.



(fig. 36 Ventifact machine 1:10)

I decided to scale up my machine to be able to show a future application. By enlarging my wind turbine in a 20-meter high machine, it could make larger sculptures and build our cities of the future. Based on the patent drawings of large-scale wind turbines, I adapted my design into my 3d software. With the 3d printer I have printed out the machine and sand object and placed it in its sand environment.

All my findings so far were presented during the final exhibition at Slash Gallery (fig. 37).





*(fig. 37 exhibition in Slash gallery)*

## 4 Conclusion

My fascination with landscapes formed by wind erosion has inspired me to explore this natural process in the design process. I wanted to find a way to use this unpredictable force to create shapes without the control I am used to as a maker.

The research focused on examples in nature, where the fascination came from and how the natural process works. The relationship between man and wind was investigated. The field of geo-engineering has been discussed, the complete desire to control wind and weather. Software programs have been used to get a better picture of how the wind searches its way around objects. These results have led to the development of a method to control the wind flow, but leave enough room for unpredictability and surprise.

The first physical tests were done in a controlled environment. Various form studies have been carried out in a number of self-built wind turbines. These have led to a series of sculptures made by a collaboration between human and wind.

Time is an important factor in the natural process of wind erosion. The forms caused by wind erosion that inspired me to start this project are often the product of thousands of years of work of the elements. The time I did not have and I had to look for ways to speed up the process. I have done material research to get faster results and have discovered and applied my own material composition. Despite this development, I was not able to find a solution for my time-problem.

The plan was to examine the process in the natural environment after working in a controlled environment. The results from the natural environment are missing in the project so far.

In an attempt to bring more depth to the project, I tried to find a speculative application for the future. The turbine was presented as a model in a model to sketch the image that my research and outcome could lead to a new way of forming and building on a large scale. The use of natural processes as a collaboration between people and their environment instead of looking for absolute control.

## 5 Reflection

Within this project I have not been able to do what I had in mind within the time I had for this project. I have not been able to sufficiently visualize my fascination with the wind as a maker and designer. In fact, I stayed in an early phase, working in a controlled environment. In this environment I had complete control over the wind, the control I wanted to give to the wind.

My attempt to give the project more depth by building a model has brought me further from the core of the project than closer. I therefore consider this part to be irrelevant afterwards. I wanted to test my way of forming with the wind in the natural environment where wind and sand are present, the beach. When I discovered during the project that the chances of success became limited, I lost sight of what I wanted to communicate in a simple and effective way. In this phase the project became more technical and the focus shifted from forming with the wind to making a wind machine. I started to combine as much information as possible that I gathered during my research. This resulted in a project which is neither the one nor the other. In other words, it became unclear what my fascination was exactly. What I want to tell has become increasingly unclear. So unclear that I lost sight of it myself.

This is not to say my research was worthless. My starting point is interesting and the information I have found is valuable. I just did not know how to cast it in the right form. In my opinion, this project, with more attention to the right parts, can be transformed into a project that meets the requirements of both academic as personal.

In my opinion, the project needs a clear final work. This is based on my research and form studies. I need to make clear what is it where I am interested in. The main theme of my work is about control and uncontrol. Inspired by natural systems and forces I want to research the possibilities within the design process where the designer is not in full control. Also the factor time needs more attention. I will give time a place because it is an important part of working with erosive processes.



## 6 Resit

### (un)control

Looking back at the 'Ventifact' project, I now have a clearer view on how to communicate my interests better than I did before.

The project is about control and uncontrol in sculpture. Natural erosion is hereby an inspiration which I am mimicking to see if its uncontrollability could be part of my work.

I will no longer focus on wind erosion alone, I will also add water and wind erosion. This to show that the aspect I am interested in, not only accure with the wind. Besides that I will leave the idea of working in the natural environment behind me. I can work with uncontrollable aspects during the making projects in a controlled environment. In matter of fact this will add value and make my point clearer. I control the environment and materials, but will have none when the process of mimicked natural erosion starts.

An important part of my fascination is not only the shapes that can be created using mimicked erosion, the process of erosion itself might be ever more interesting. That is why I want to show the three erosion types, wind, water and ice as part of an installation. The work is a combination of the controlled environment and the erosion process itself. Being able to see an object being deformed by a mimicked natural force, adds value and shows one of my biggest interests.

By showing the process of erosion, the element of time is also present. Although the mimicked erosion takes place faster than its natural process, it will take time to see the object change. The object will change over time into a sculpture created by me and a uncontrollable force.

The installations show the opposite of what our production processes are mend to function. We desire absolute control in the shortest time possible. The outcome should be predictable and calculated. In this project I want to experience how it would be and what outcome I would get without being in control. Make room for experiment and surprise in the design process mimicking one of nature's most powerful shaping tools.

### Process

#### Water

I used materials and knowledge from the Ventifact project. This new approach also gave me the opportunity to work with magnesium blocks. I found out that using vinegar causes a chemical reaction and therefore can be used to mimic water erosion. I used a plastic bags with needles to slowly drop the vinegar drop by drop on the magnesium. I wanted to use sterile, 'unnatural' materials, like plastic and MDF to increase the contrast between the installation and the shapes caused by erosion. I tried to mould the magnesium but these experiments failed, so I decided to use this material in its premanufactured from.

Later in the process I have added a kitchen clock and placed the magnesium block on top of it to make it turn. The installation creates 1 hour sculptures and gives hereby uses time as an element in the process.



## Wind

This part comes very close to the Ventifact project. This part is basically the same but more attention is given to the design of the machine in order to turn it into an installation. I have used small propeller fans with flexible arm to have more control over the airflow direction. By placing it in the glass tube makes it possible to see both the object which is being deformed as the movements of the sand. The sand is in this case showing the element of time. Moving very fast around the object, deforming it very slow. This installation can last until the object is completely blown away or can be taken out when desired. I have used different geometrical shapes but ended up with the sphere, while this would create balance between the three different installations.



## Ice

This installation is showing the erosive power of melting ice. This process takes the most time, both to make and to see it change. I wanted to add the element of time by placing the installation on a glass bowl, so water is able to drop down when melted.

Using a cone shape with a block of ice on top. After taking it out of the freezer, the ice slowly melted and leaves behind shapes in the surface of the cement used as the material for the sphere. The cone is chosen to keep the installation in balance. I have done tests with a cylinder shape, but this one crushed down in an early stage. The cone seems to be the solution so far.

Cement is chosen because in powder form is easy to transport by water. It also absorbs the water and uses it to start the drying process of the material. Resulting in a hard object, shaped by the slow dripping of melted water.



## Reflection

Although I was not completely satisfied with my first Ventifact project, the fact that I needed to do a resit gave me a lot of stress and had more effect on my mood than I expected. I learned that a better planning is necessary during my graduation process.

The outcomes of the installations suffered from a certain insecurity that appeared after the first presentation, which resulted in a redo. I have done my very best to create interesting and well made experiments which were able to tell my story. I believe I did. These are three installations showing my interest in working with control and uncontrol in sculpturing. I wanted to make it simple and speak for itself. I am convinced that I improved my communication through my work when I compare it with the previous project. I am therefore more proud of this work. Although the process

Ventifact; wind erosion in the design process

sometimes did not run smoothly, my interest in natural systems and finding ways to work with them will never disappear.

I want to thank Shailoh and Ivan for their feedback and support.

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## Bijlage 1: Fotodocumentatie onderzoek

