

PLEASE LEAVE THIS INFORMATION IN THE WINDMILL

Modellenzolder (The attic with lot's of models)

A windmill is a mill that converts the energy of wind into rotational energy by means of vanes called sails or blades. Centuries ago, most windmills usually were used to mill grain, pump water, or both. The majority of modern windmills take the form of wind turbines used to generate electricity, or windpumps used to pump water, either for land drainage or to extract groundwater.

Here you can see (don't touch!) several scale models of Dutch windmills. You can see that different mills had different uses: to transship water, grinding grain, to make cement, paper (using old cloths), spices, oil. In a sense the entire mill is a museum. The models were created by the group of millers (all volunteers, like our tourguides) whom maintain the windmills in Haarlem.

The machinery inside differs if the windmill is used for other applications than milling grain. A drainage mill uses another set of gear wheels on the bottom end of the upright shaft to drive a scoop wheel or Archimedes' screw. Sawmills use a crankshaft to provide a reciprocating motion to the saws (see our models).

DIFFERENT MODELS:

- Model Kap van Molen De Adriaan (the top or cap)

This model represents the cap of this mill, De Adriaan. This 8-sided smock mill is made of wood, even the studs are made of wood. Have a closer look at the sails, the main windshaft, break wheel with break blocks, the mill stones and the 'steering' wheel on the deck.

Gears inside a windmill convey power from the rotary motion of the sails to a mechanical device. The 4 sails (actually two shafts) are mounted on one end of the horizontal shaft. Windshafts can be wholly made of wood, or wood with a cast iron poll end (where the sails are mounted) or entirely of cast iron. The model shows a wooden shaft, the real shaft of De Adriaan is made of cast iron. The brake wheel is fitted onto the windshaft between the front and rear bearing. The brake blocks are positioned around the flat surface of the brake wheel, while the teeth on the side of the wheel drive the horizontal gearwheel called wallower on the top end of the vertical upright shaft. In order to work (sails rotating), it is important that the mill is facing the wind. The Miller makes the main wheel. In the axis here a cable with a hook. The miller turns the cable and hook it and recloses in different parts of the floor of the gallery.

The next model is a representation of the rotating cap. When the miller wants to turn the cap, you have to brake and stop the movement of the sails. He does it with that stick with a rope. The cap can be turned 360 degrees around on bearings. In the old days on wooden bearings as you can see.

- Vitrine rechterzijde (showcase on the right)

In the showcases you can see all sorts of materials that were grinded with Dutch windmills. The Adriaan was initially used to produce 'cement'. By mixing 'tras' (grinded tufstone, volcanic rock found in Germany) with water it creates mortar (it even works for building a wall under water). In the showcase you also see shells used to produce china, barks of trees to produce leather softener and samples of sawing stones or trees.

- Vitrine met kruiden e.a. (other showcases)

In the showcases you see many samples of materials grounded for different usage like tobacco leaves for snuff, pepper, mustard. Or cocoa beans to make chocolate. All these products came from the Far East (mainly Indonesia). Holland colonized the far east (Ceylon, Nederlands Indie – now Indonesia) or had trading settlements like Decima in Japan. All sorts of spices, hard woods and porcelain were shipped to Holland for further trading in Europe. For a very long time, the trade of spices was big business, risky but very profitable.

- Model Oliemolen (mill model oil production)

You can see an ingenious model of a mill to produce oil from linseeds (not olives). First the seeds were grinded (two vertical stones). To get the oil out the mass has to be heated as second step That takes place in the ovens next to the grinding platform. Once heated (oil becoming fluid), the mass is moved into one of many buckets where beams lifted up by windpower are released hitting on the mass and squeezing out the oil. Good quality oil to be used in paint. All that, with the energy of the wind and a little coal.

- Model Poldermolen (Model of a drainage mill)

The next model is a drainage mill. It is a mill to adjust the water level in a channel or polder. When the sails are turning the vertical shaft will drive the scoopwheel or archimedes screw, lifting jack up the water. This water is pumped into a canal, to flow to a river and onwards into the sea. In current times several drainage mill are designated as backup in case electrical or combustion functioning pumpstations fail.

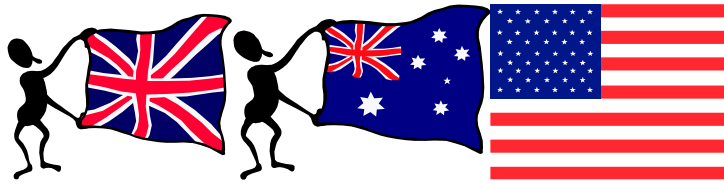
- Map with existing windmills in Holland

Of the 10,000 windmills in use in the Netherlands around 1850, about 1,000 are still standing. Most of these are being run by volunteers, though some grist mills are still operating commercially. Many of the drainage mills have been appointed as backup to the modern pumping stations. The Zaan district (24km from here) has been said to have been the first industrialized region of the world with around 600 operating wind-powered industries by the end of the eighteenth century.

- Molen De Eenhoorn (Model of mill De Eenhoorn)

In the center you see a model of a mill for sawing or chopping wood. The sails drive a frame with saw blades with which you can cut tree trunks and convert them into planks. This mill was designed in the seventeenth century and used a crankshaft to provide a reciprocating vertical motion of the saws. The crankshaft is an invention from Roman times, but applied and patented by a clever Dutchman. The traditional way to saw planks was manually. Two men worked all day to make a horizontal saw cut of four meters. The mill produces 60 planks and more in the same time. This mill is located in the south of Haarlem. It called De Eenhoorn - The Unicorn.

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Adriaan Attic

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The windmill Molen De Adriaan started to be used for grinding volcanic rocks to produce cement, later tobacco to produce snuff and finally to grind wheat to produce flour. (same stones for grinding, but not simultaneously).

The machinery inside differs if the windmill is used for other applications than milling grain. A drainage mill uses another set of gear wheels on the bottom end of the upright shaft to drive a scoop wheel or Archimedes' screw. Sawmills use a crankshaft to provide a reciprocating motion to the saws (see our models).

Model of Molen De Adriaan

Can you point out where you think we are now?

Molen de Adriaan – it's different functions

The Adriaan, built by Adriaan Dubois (we say Adriaan De Boois) was a merchant from Amsterdam who already owned a 'whim' (or horse treadmill) on the Koudenhorn, which is across the river from the Adriaan. He built his windmill on the foundations of the former 'Goê Vrouwetoren' building.

Adriaan De Boois saw the need for housing. There was no short supply on bricks. Cement was needed. For the next 25 years he had the monopoly for grinding tuffstone. This kind of volcanic stone when mixed with the powder of Marlstone and water results in a waterproof mortar ("Roman cement"). Unfortunately for him he was not as successful as he had hoped.

So he also grounded other material. Oak-bark was finely ground into oak-tan for use in tanneries, while tropical wood was ground to powder for use as a pigment for the dye-industry. Shells for the pottery industry were ground as well.

In 1802, after the end of the monopoly, Adriaan Dubois sold the mill. The new owner, Cornelis Kraan, converted the mill into a snuff mill. Tobacco snuff was highly popular in those days. You can still see a sign showing the mill, high above his former shop where he once sold the tobacco products in 12 Grote Houtstraat in Haarlem.

In 1865 De Adriaan was refitted as a grain mill and a steam engine was added, so that even when there was no wind, the mill could still function.

In 1920, the steam engine was replaced and the mill was driven by electricity. The Adriaan then had 5 (!) mill frames: 3 operated by wind and 2 by electricity.

Maalstenen model on the Adriaan attic (mill stones)

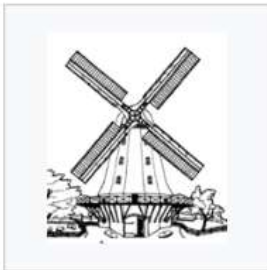
This is a model of the grinding operation of this mill. Wheat is shuttled into the middle opening of the top millstone, the top stone rotates, the grains sucked and grinded between the two mill stones, and the flour will be guided thru a duct into a sack on the floor below.



Communication

For hundreds of years Dutch millers had a system of communication with their customers (farmers etc) by setting the sail-arms in a certain position.

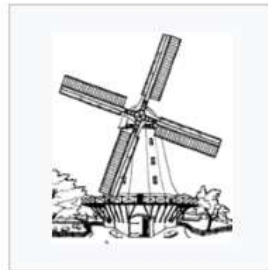
When the sail-arms are in the diagonal or cross-over position, it indicates Lange Rust (long rest) what means that the mill is not working. This is also the lowest possible position and the sail-arms are therefore least likely to be struck by lightning.



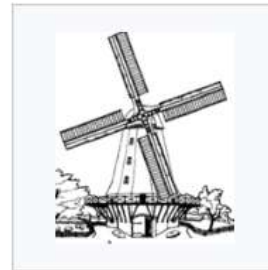
Lange rust



Korte rust



Vreugdestand



Rouwstand

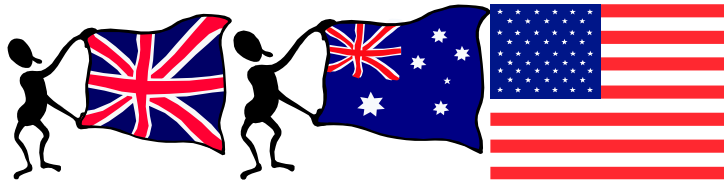
When the sails are in the upright position, it signals Korte Rust (short break) meaning that the miller is making changes or is really taking a break.

The Vreugde (rejoicing) position indicates that the miller's family has something to celebrate: for example, a wedding or a birth. The sails are in 'coming' position (the miller stops the sail just before it reaches its highest position) and the proverb 'he sailed before the wind', (he prospered), still reminds us of that.

The Rouw (mourning) position where the 'departing' sail-arm is stopped, just after it leaves its lowest point, indicates sadness and mourning. A number of millers still honour this when for instance a member of the Royal Family dies or during the 'commemoration of the dead'.

The Hakscheef. position (bottom sail a little right outside the contour of the Mill, not visible on this drawing) was used when the mill stones needed sharpening because of wearing and farmers knew that no grinding could be done and itinerant mill stone dressers were made aware that their services were required. As there used to be 70 mills around Haarlem, they were always in demand. The sail-arms of windmills in The Netherlands always rotate to the left, counter clockwise.

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Millstone Attic (steenzolder)

Go up the stairs, Mind your head going up, and please take note of the small steps going up and later going down!

Here we can complete our understanding of the operation of the mill. The great spur wheel, lower down of the upright shaft (6-8 meters long), can drive the wheel connected to the shaft driving the top millstone.

The main shaft here is made of oak. The walls are made of pine boards. When the Miller takes the brake of the main wheel in the cap, the spur wheel will start spinning. The grain will be shaken into the middle of the top millstone and flour will come out between gap of the two stones. The miller can control the height of the stones (the rhythm of the wind influences how the stone acts - to always get the same consistency of flour, top stone must be set according to how fast it spins). The little cowbell informs the miller when he needs to refill the 'kaar' grain holder.

To clean the teeth and deepen the channels, there is a iron to lift the stone.

Farmers used to bring their sacks with grains (wheat or other) to the mill with horse/ox pulled carriages. The great spur wheel can be used to hoist the sacks with grain from the ground floor up to this level in the mill and hoist the sacks of flour from the level below to the ground. If there is no wind, the miller can hoist the sacks up and down manually with the rope (try it, and put up a face that it is heavy).

Raam zuidoostzijde steenzolder (southeast stone attic window)

Look beyond and see the dome which was an old prison, scheduled to be converted to a university campus in 2019. It was built in 1902. The building to the right with the two towers is called "the gate of Amsterdam" (there is a similar tower in Amsterdam, at the end of the canal and road connecting the systems thru Halfweg (halfway)). The Blue Tram was famous to bring people from Amsterdam to the beach in Zandvoort. Now a highway and trainways connect the two cities. One a clear day, you can see the control tower of Schiphol airport.

Grinding Attic (maalzolder)

Next step in the tour is going down one level (please go down the stairs backwards for safety)

The wooden pipe from above is the conduit for flour, which you have already seen in the model. During the grinding the miller will manually feel the fineness of the flour and he can adjust the height of the stones. The miller fills the sacks here, can block the flow to close a full sack and weigh the full sacks on the scale (also for determining the fee to be paid by the farmer in currency or goods).

Gallery (naar Stelling)

Outside you will notice the vertical 'steering' wheel with which the miller rotates the cap of the mill into the wind. The chain with hook is loosened and placed in one of the holes on the board. Then by turning the wheel the chain is shortened, and as a consequence the cap moves into the direction of the fastened hook. This can be repeated as often as needed to get the sails straight

into the direction where the wind is coming from. The horizontal pole high up with a thick rope is called 'Vang'(catch), which is the break to start/stop the sails rotating. When the miller determines that the extra cloths sails are needed. The deck is 12,5 meter above the ground. Each sail is also 12,5 meter long. Please notice that your eyes are being tricked when you compare the distance to the ground and to the center of the sails. The miller will first stop the sails rotating, then he can climb into the sails one by one to secure the sails, you have to climb the sails. Please enjoy the fantastic view of the city around you, and when the sails are rotating, marvel about this centuries old technology, developed without computers.

Around the Mill far away and close:

- Windmills, wind used to to generate electricity;
- Down next to the restaurant Zuidam: a shipyard with ship sculpture, used till 1990, only only remaining sample of dozens of shipyards along the river;
- Old millstone made of granite: found near the mill;
- The background: the church "St. Bavo". Built in 16th century;
- The river: "Spaarne" streams into the the IJ in Amsterdam thru Spaarndam on one side. The water came from the Haarlemmermeer, which used to be largest sweet water lake in Europe, which needed to be drained around 1850 as there was imminent risk that Amsterdam and Leiden would be completely flooded on a next big storm. When it became a polder south of Haarlem, and was used for agriculture, now it houses Schiphol Airport, thousands of companies and nearing 100.00 inhabitants.

Haarlem is located on a plate of sand that was formed 10,000 years ago, there were built the first houses. In the Middle Ages the dunes separating the sea from the land and from then formed, Haarlem has been able to expand above sea level.

Back to the Exit (Naar de uitgang)

When you return to the ground floor you are invited to visit the shop to buy souvenirs of the mill or enjoy a cup of coffee, tea, hot chocolate or water. On the first floor you will find our exposition about the history of Molen De Adriaan, and you can watch our revolving videos about the city and it's river Spaarne thur the ages and about windmills around Haarlem. This is also the area which can be rented for meeting, parties and marriage ceremonies.

There is a visitors book.

We invite you to leave your comments about your visit.

Thank You.

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