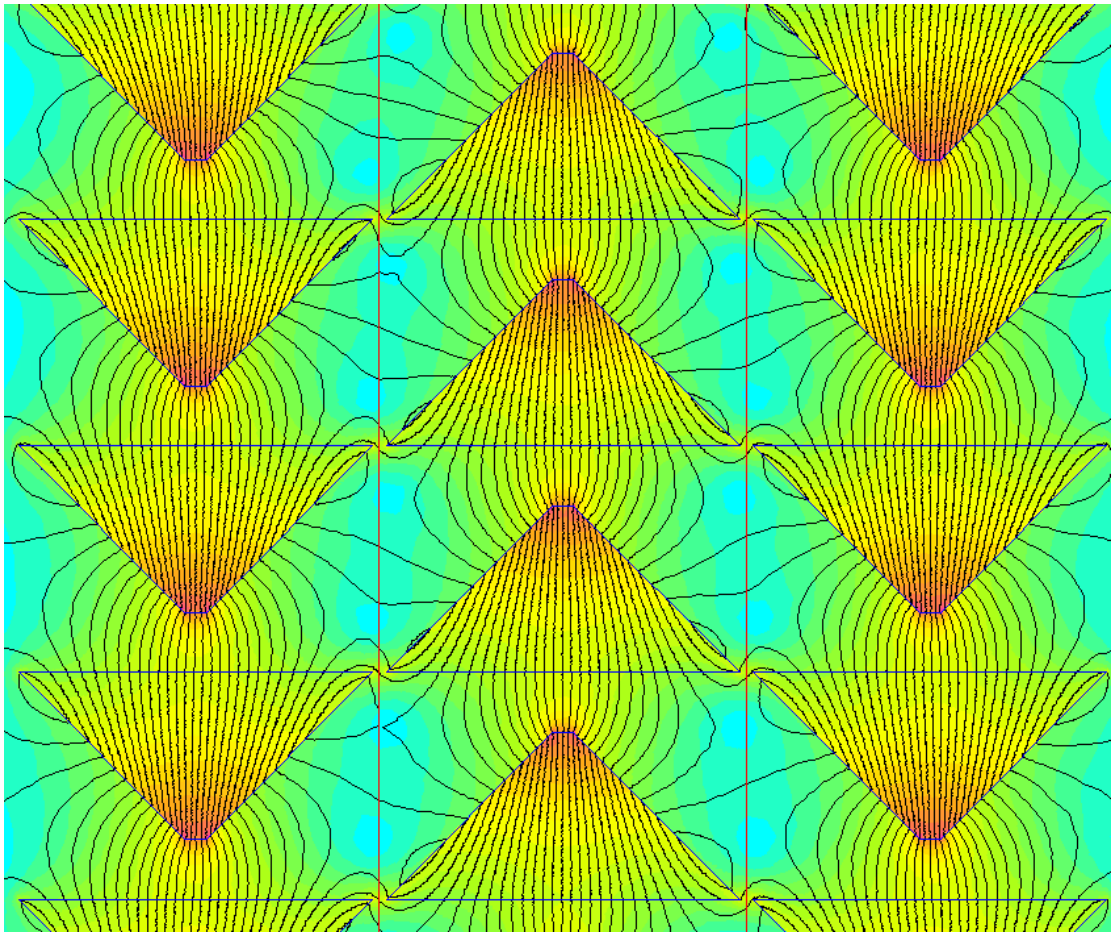
Permanent Magnet Motor

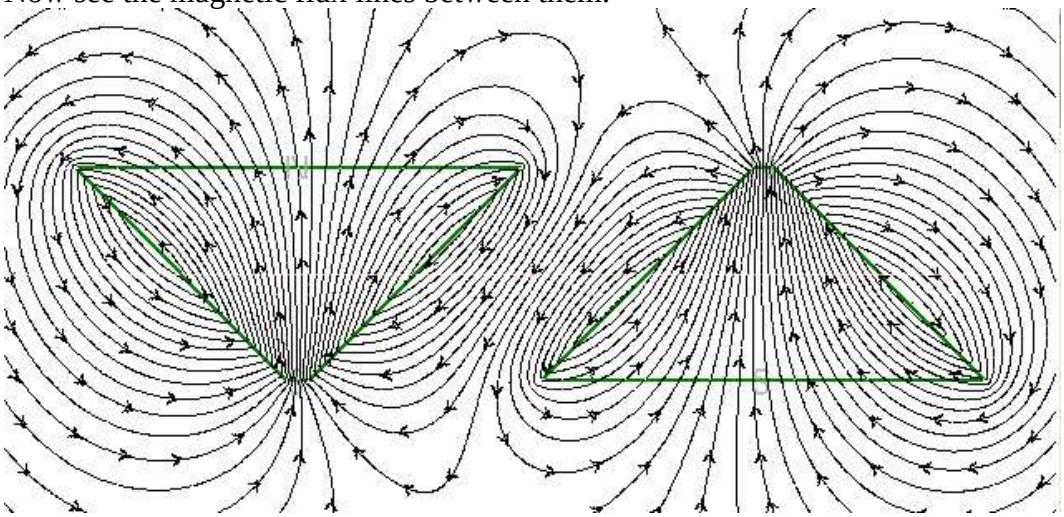
concept



| STATOR | **ROTOR** | STATOR |

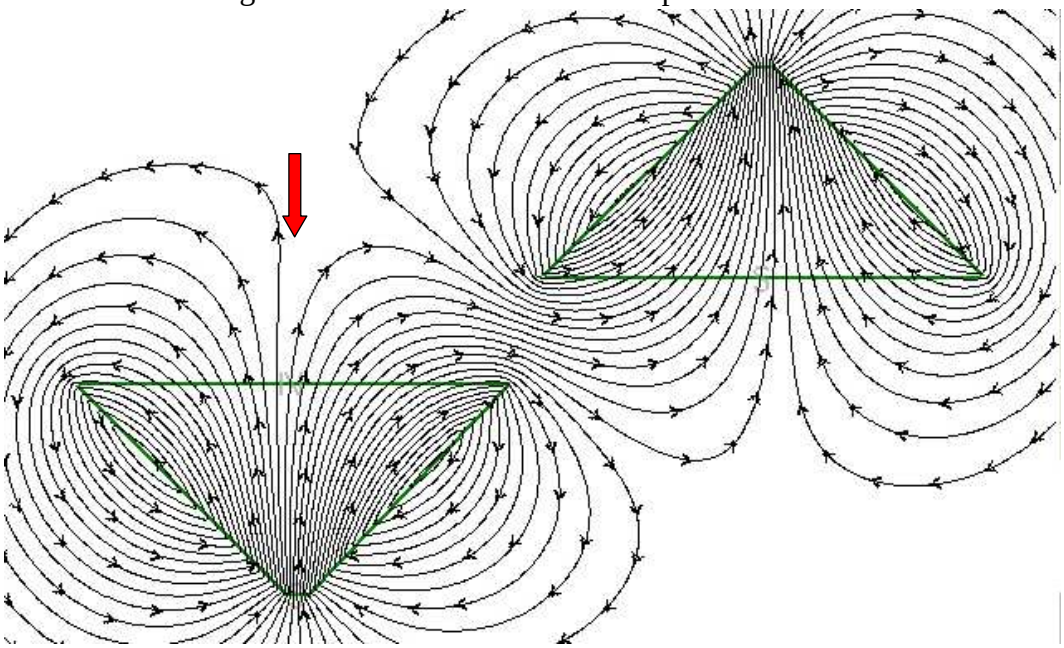
First we begin by taking two triangular magnets.
These magnets are 45 – 45 – 90 degree triangles.
Notice the North Pole and the South Pole are reversed on the magnets.

Now see the magnetic flux lines between them.



Notice the lines between them begin from and go back into the same magnet.
These are the lines of magnetic **repulsion**.

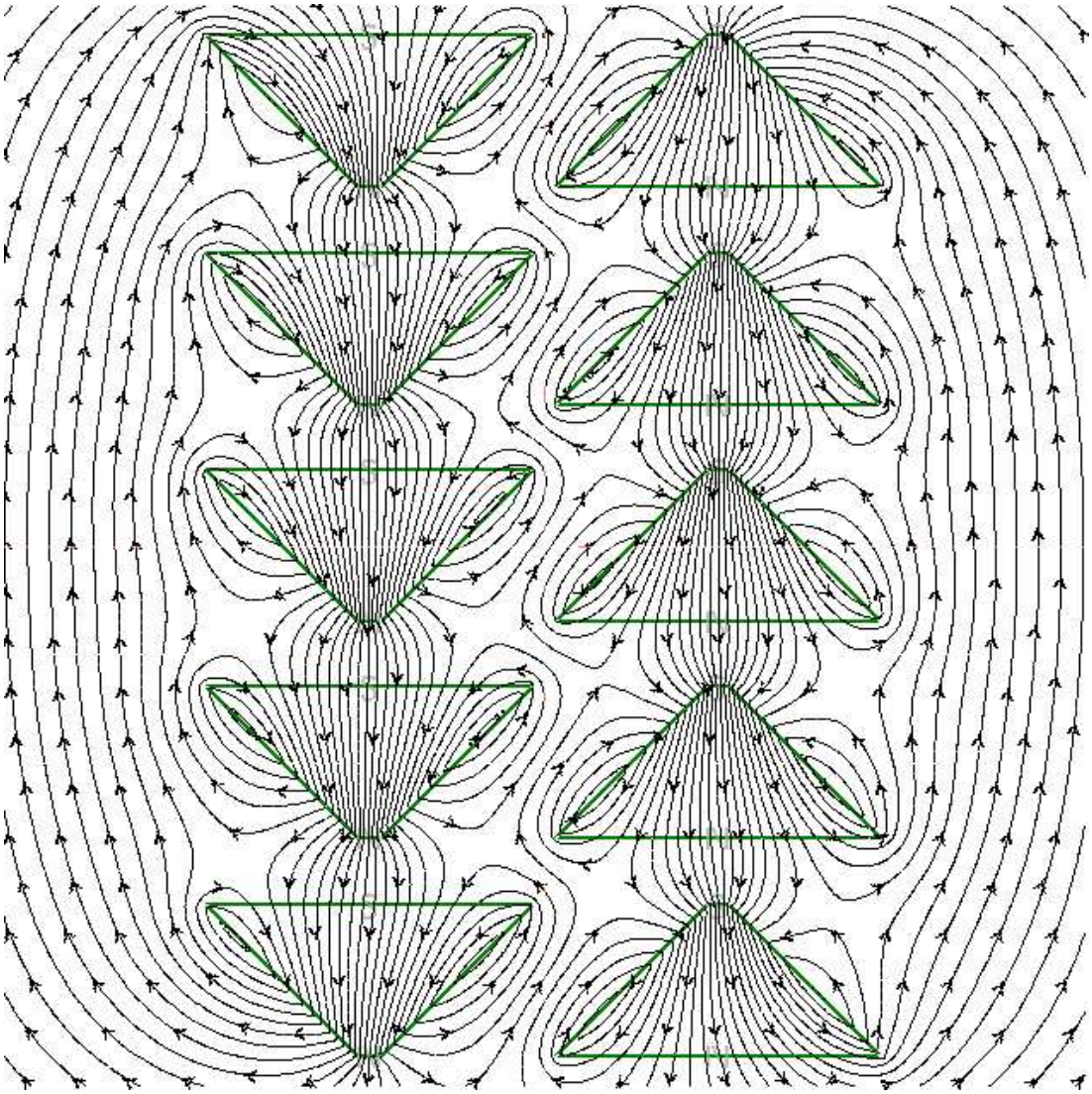
Now move the magnets so that the north and south poles face each other.



See the lines which pass from bottom of one magnet to the bottom of the other.
These are the lines of magnetic **attraction**.

Now let us stack up five magnets on both sides.

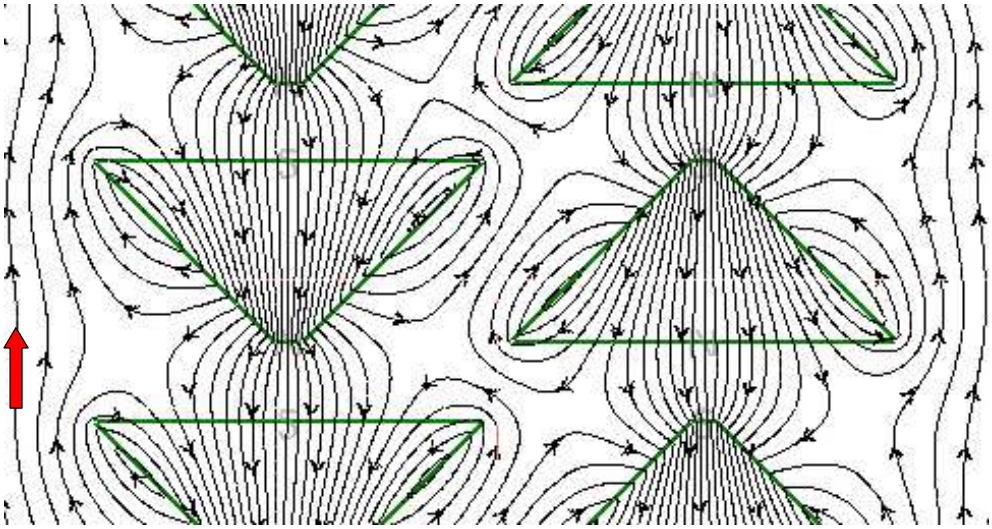
| **ROTOR** | STATOR |



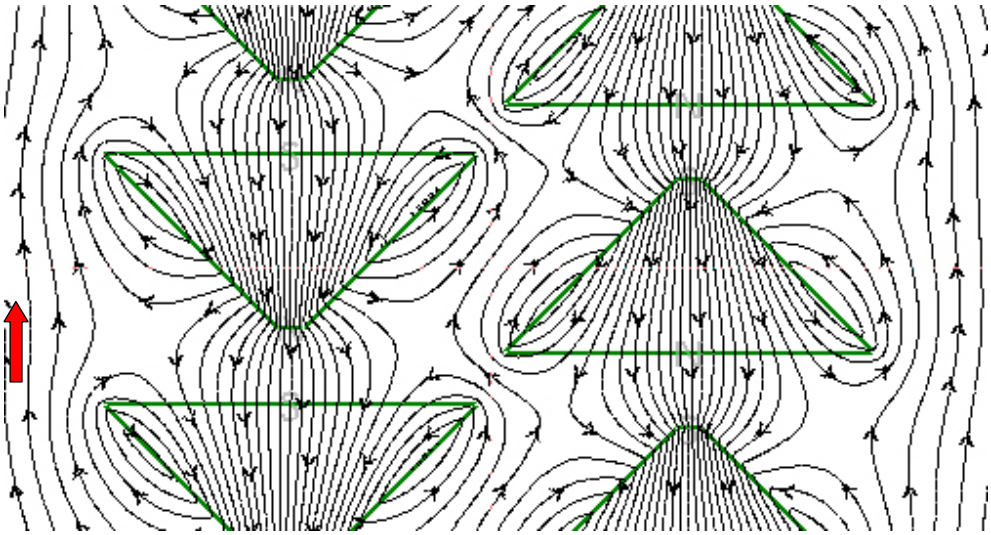
There are lines going from the top magnet to the bottom magnet on each side.
This will not happen when we arrange the magnets in a circle.
A circle does not have a first and last magnet.
If we look closely at the middle magnet, we can see what will happen inside the circle.
If the magnets on the right remain stationary and the magnets on the left are allowed to rotate, the magnets on the right will begin to push the magnets on the left away.
We will now watch as the magnets on the left move through 10 different positions.
Notice that there never occur any lines of attraction.
This is because the lines of repulsion are always greater then the lines of attraction.

Position# 01

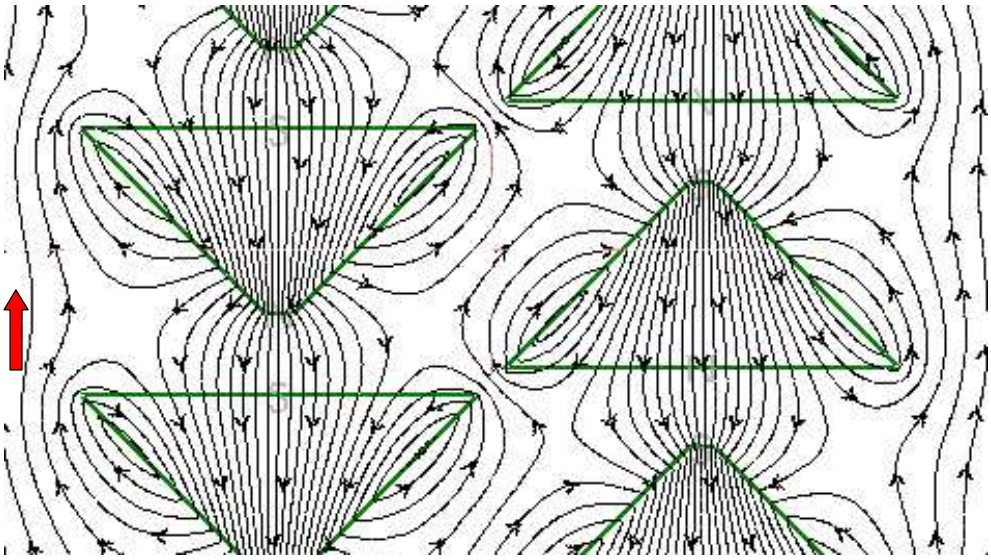
| ROTOR | STATOR |



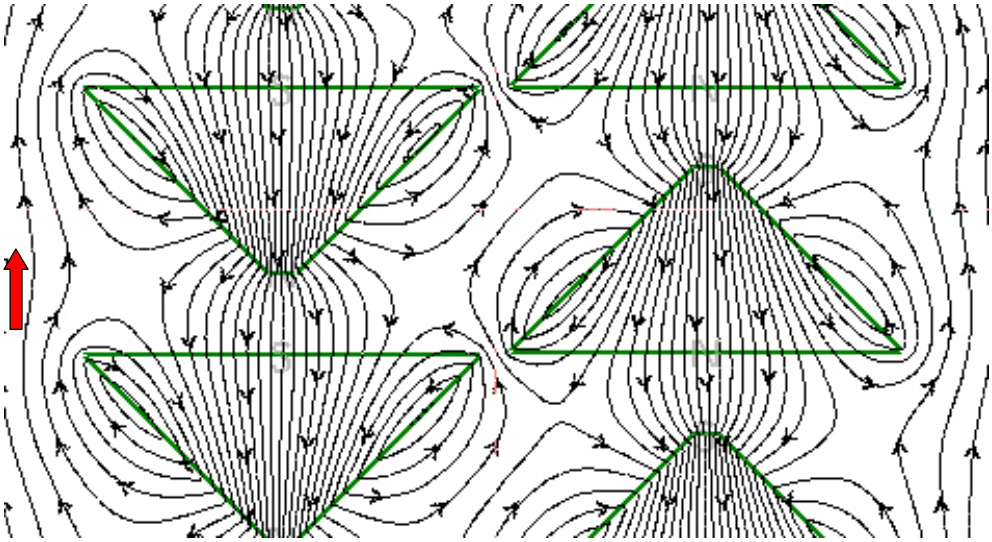
Position# 02



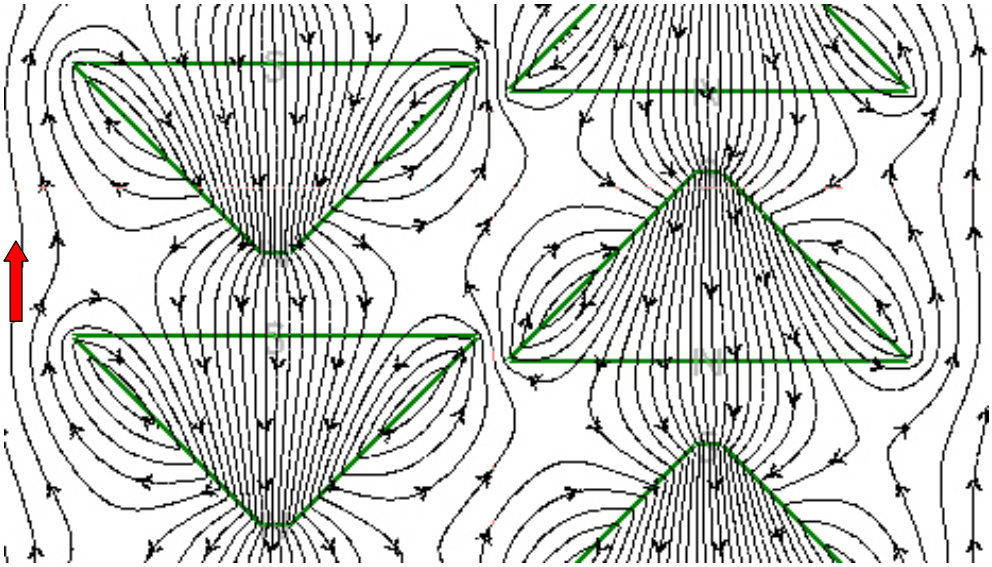
Position# 03



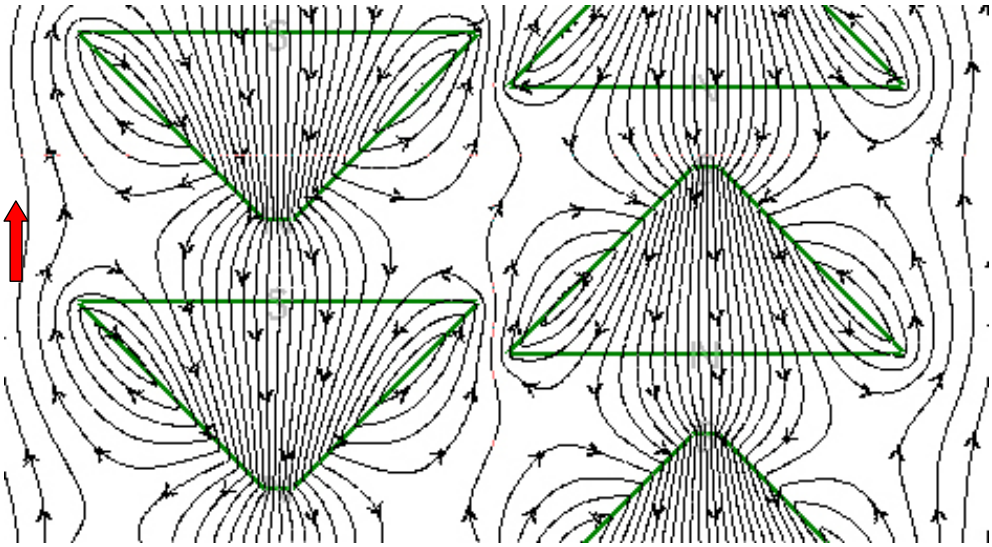
Position# 04



Position# 05

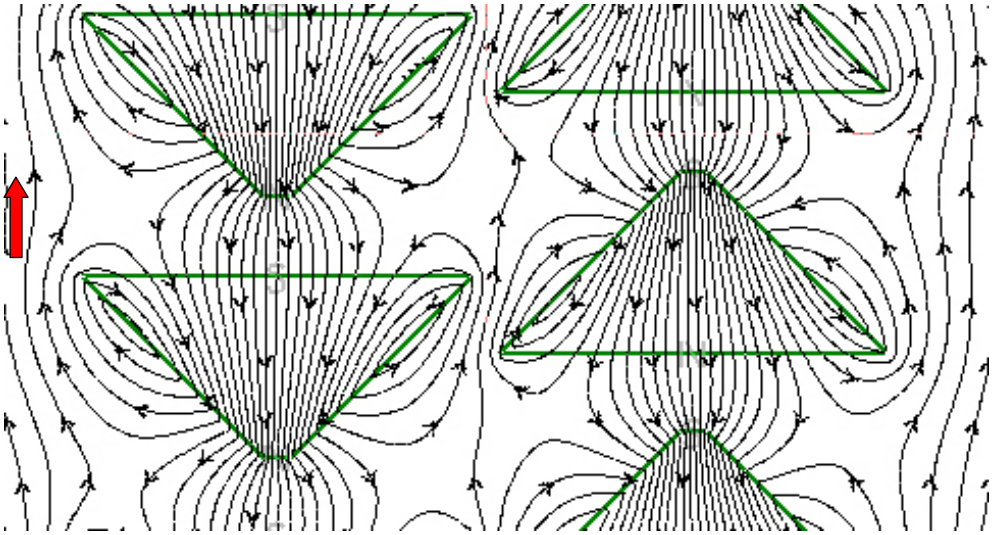


Position# 06

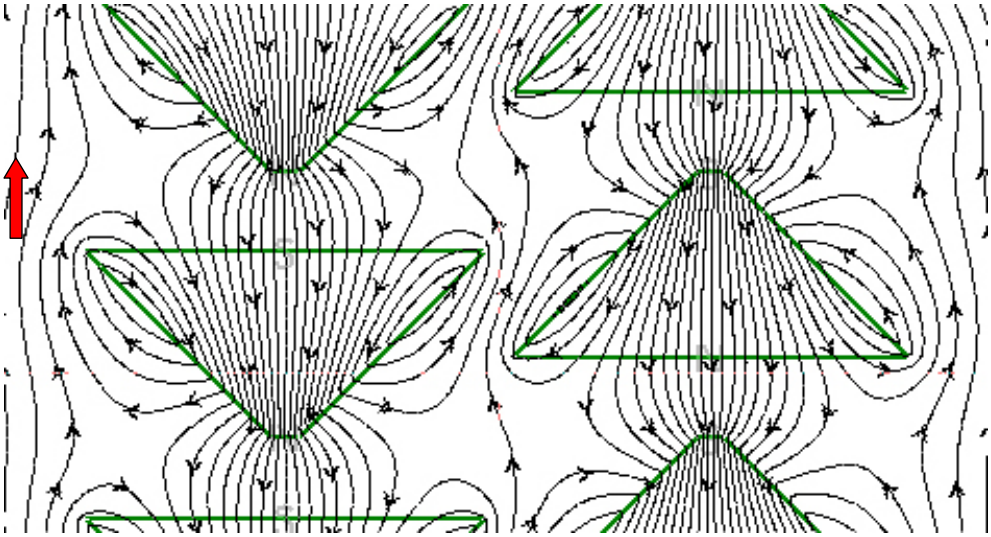


Position# 07

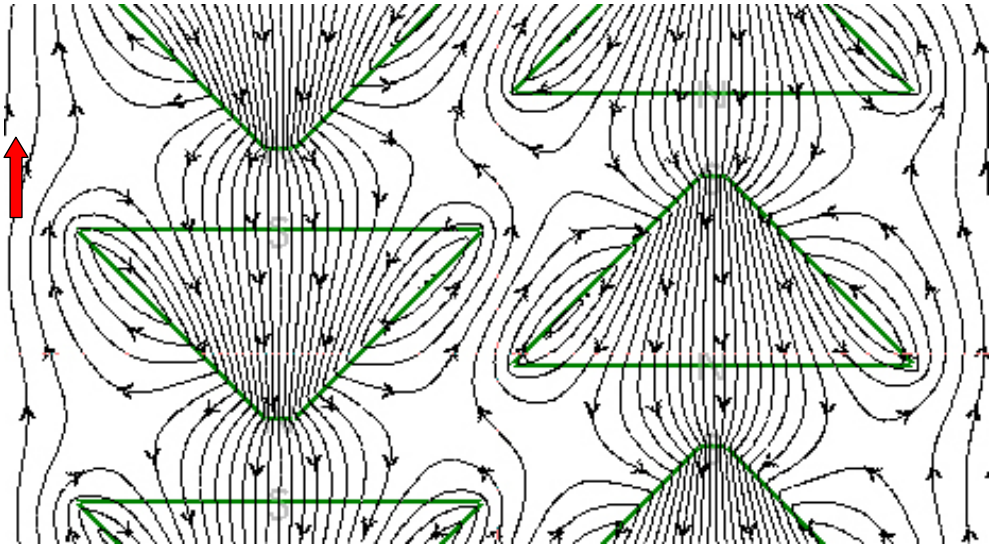
| **ROTOR** | STATOR |



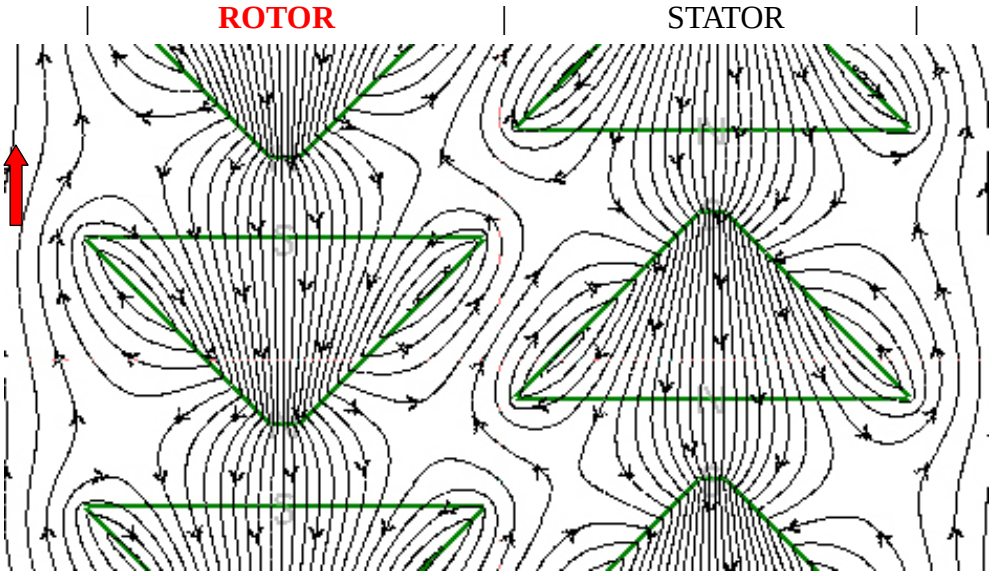
Position# 08



Position# 09



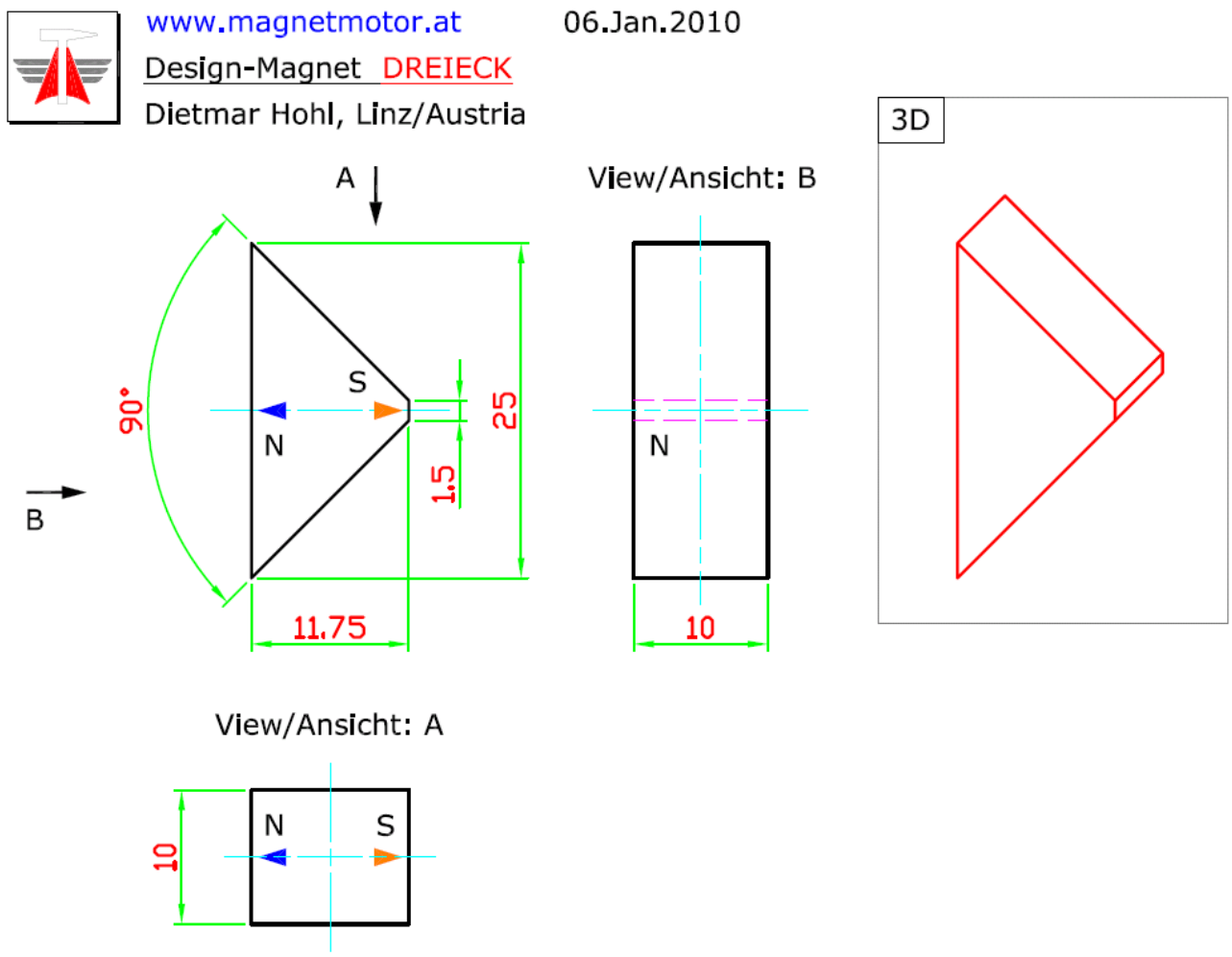
Position# 10



Not only is the repulsion always greater then the attraction, but also the repulsion is in a certain direction. If we do this with flat magnets, the repulsion will always be at 180 degrees. There will be no movement.

However, when we do this with triangular magnets, the magnetic lines between the north and south poles are at an angle, and this will push the opposing magnets at an angle less then 180 degrees.

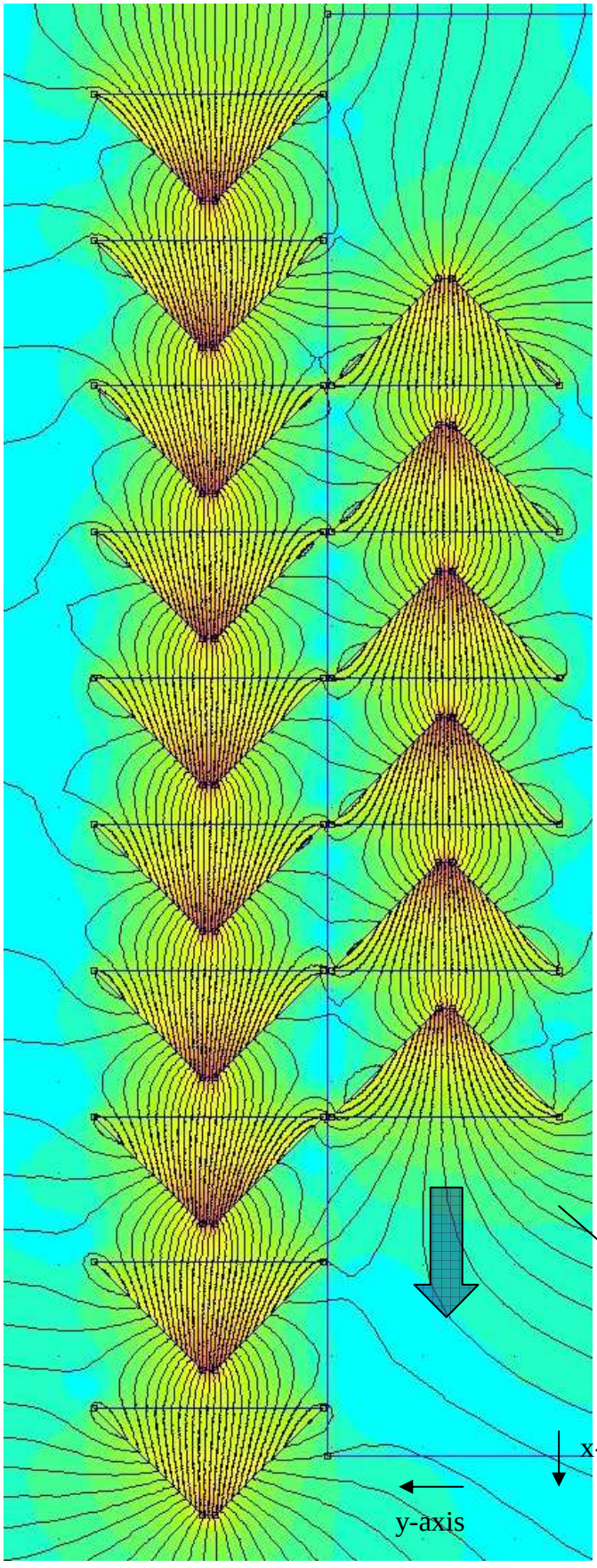
The used magnet for Test# 01 & 02:



material /quality:	Neodym (NdFeB) / **N40**
flux density:	1,25 Tesla = 12500 Gauss
product of energy:	310 kJ/m3

volume:	155,687 cm3
weight:	1162,3 g / 2,562 lb
stored energy:	48263,125 mJ (mWs)

Test# 01 **S t a r t** | **STATOR** | **ROTOR** |



Simulation: ***FEMM***

Test# 01 Result

Move (mm)	x-axis		
1	-14,094	N	-14,094
2	-12,307	N	-12,307
3	-8,516	N	-8,516
4	-4,513	N	-4,513
5	-0,761	N	-0,761
6	2,533	N	2,533
7	4,858	N	4,858
8	6,377	N	6,377
9	7,015	N	7,015
10	6,789	N	6,789
11	5,559	N	5,559
12	3,336	N	3,336
13	0,703	N	0,703
14	-3,253	N	3,253
15	-7,273	N	7,273
16	-11,372	N	11,372

attraction LOSS

repulsion WIN

attraction WIN

energy balance

LOSS :	40,191	N	
WIN :	59,068	N	
DIFFERENCE :	18,877	N	WIN !

Note: **The result is not 100% correct. An integration with the x-axis must be also done!**

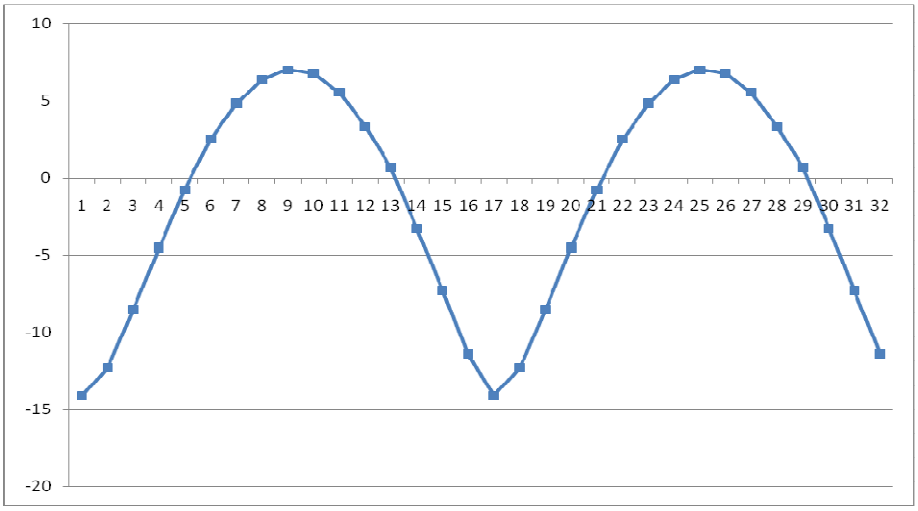
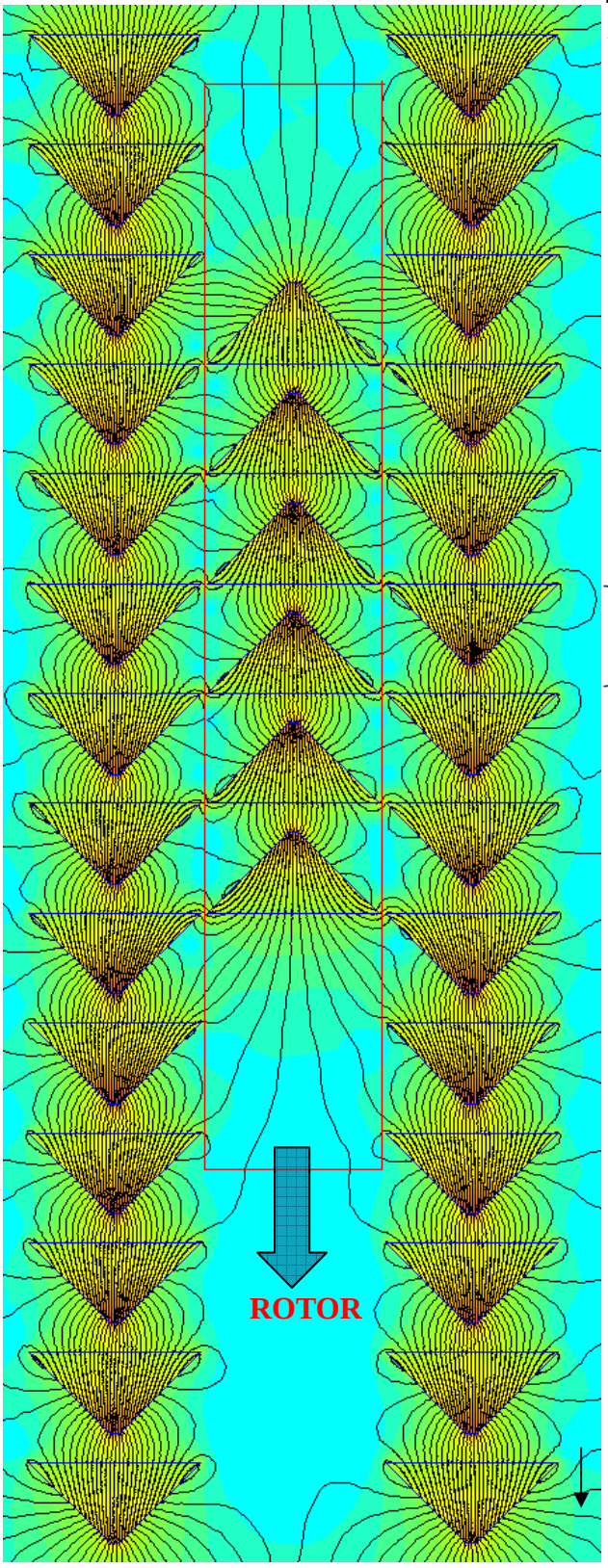


Chart of two cycles.

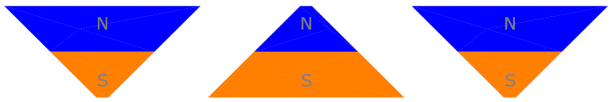
| Linz, 09.Jan.2010

In the Test# 02 the **ROTOR**-magnets are balanced exactly against the Stator-magnets.
So all y-axis strengths are always be zero. ;-)

Test# 02 **S t a r t**



| STATOR | ROTOR | STATOR |



Simulation: ***FEMM***

= **16 mm**

gap ROTOR/Stator = 1 mm

x-axis

y-axis

Test# 02 Result

move (mm)	x-axis		
1	-24,413	N	-24,413
2	-21,280	N	-21,280
3	-13,644	N	-13,644
4	-5,596	N	-5,596
5	1,867	N	1,867
6	8,067	N	8,067
7	12,607	N	12,607
8	15,631	N	15,631
9	16,995	N	16,995
10	16,414	N	16,414
11	14,034	N	14,034
12	9,816	N	9,816
13	3,925	N	3,925
14	-3,414	N	3,414
15	-11,848	N	11,848
16	-20,060	N	20,060

attraction LOSS

repulsion WIN

attraction WIN

energy balance

LOSS :	64,933	N	
WIN :	134,678	N	
DIFFERENCE :	69,745	N	WIN!

Happy Flux, *Dietmar* ;-)

| Linz, 10.Jan.2010

Englisch: http://www.magnetmotor.at/wissen/PMagnetMotor_e.pdf
German: http://www.magnetmotor.at/wissen/PMagnetMotor_de.pdf

Test# 03 **Dreieck_A_N40**

Setup: http://www.magnetmotor.at/wissen/Setup_Dreieck_A_N40_e.pdf

Data: http://www.magnetmotor.at/wissen/PMM_EB_Dreieck_A_N40x_e.pdf
Chart: http://www.magnetmotor.at/wissen/PMM_EB_Dreieck_A_N40_chart_e.pdf

Project: http://www.magnetmotor.at/wissen/dreiecke_A_N40.rar

A factor of **1:3** LOSS/WIN seems possible (!)

lg *Dietmar* ;-)

| Linz, 14.Jan.2010

HQ-Simulation **Deieck_04** (70,5MB):
http://www.file-upload.net/download-2207973/ani_dreieck_04.wmv.html

F&E-Sim Video (Dreieck_04):
http://vids.myspace.com/index.cfm?fuseaction=vids.individual&videoid=102586055

Our special thanks to Stan for his support of correct *FEMM* -Simulations. ;-)
Pls have a small look under his Hompage: http://qdmechanic.com/

| Linz, 29.Jan.2010