Module-Based Sculptural Constructions

Roland de Jong Orlando
Sculptor
Burgerweg 8, 1754 KB Burgerbrug
the Netherlands
E-mail: dejongorlando@hotmail.com www.dejongorlando.com

Abstract

At the end of my studies at the Academy of Art in Amsterdam (1990) I started focusing on the most elementary way of making a constructive kind of sculpture by simply cutting beams and reassembling the parts. This lead to the development of modules, which I currently still research and use for ongoing projects, trying to find new applications every time. For many years the first steps I took in my creative process meant making several wood block models, but since a couple of years I tend to develop the design on the computer, with Rhino 3D. That design is then the basis for making a scale model or even directly constructing the actual sculpture from it. The combining and rearranging of these modules according a systematic approach often result in simple looking sculptures, yet often complex in structure. This paper will show you the path I have followed.

1. Introduction: Basic Principles

1.1. Basic cutting. When cutting a beam as shown in figure 1a, the two obtained parts can only be reassembled neatly (other than in the original position) by turning one of them a full 180º.

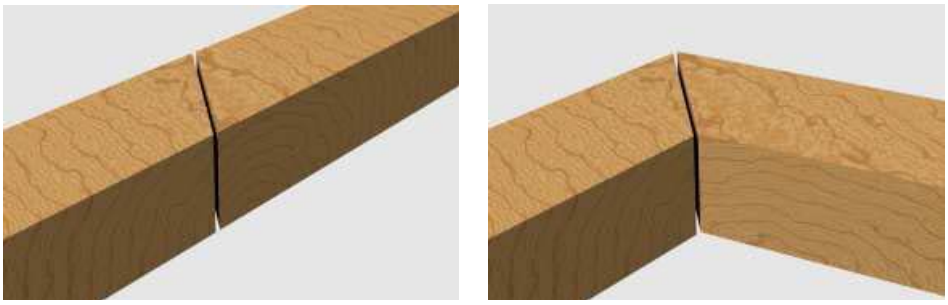


Figure 1 a,b: *Basic principle of cutting and reassembling*

1.2 Basic module. When cutting a square beam twice under the same angle (e.g. 30º) but in opposite directions, as in figure 2a, you create a simple trapezium-shaped module which, when combined with more of the same modules as in figure 2b and 2c, will always result in a 'circular' form (in this particular case of a 30º angle it is a closed form), which is not really three dimensional except for the thickness of the material.

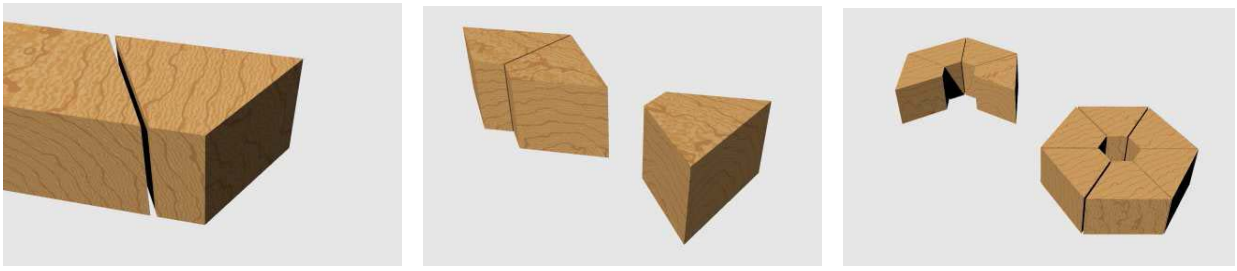


Figure 2 a,b,c: *The basic module and the combination of two, four and six of them.*

2. Second Module

2.1 Production of the second module. As a sculptor I'm obviously interested in volume within form, so the basic module wasn't useful to me. My first solution was to create a trapezium module where the cross section is square, as in figure 3a. This meant that the beam I was using could not be square, like e.g. 10 x 10 cm. In order to have a cross section of 10 x 10 cm. with a cut under 30º, the beam had to be 10 cm x L cm, where L = 10 x cos 30º = 8.66 cm).

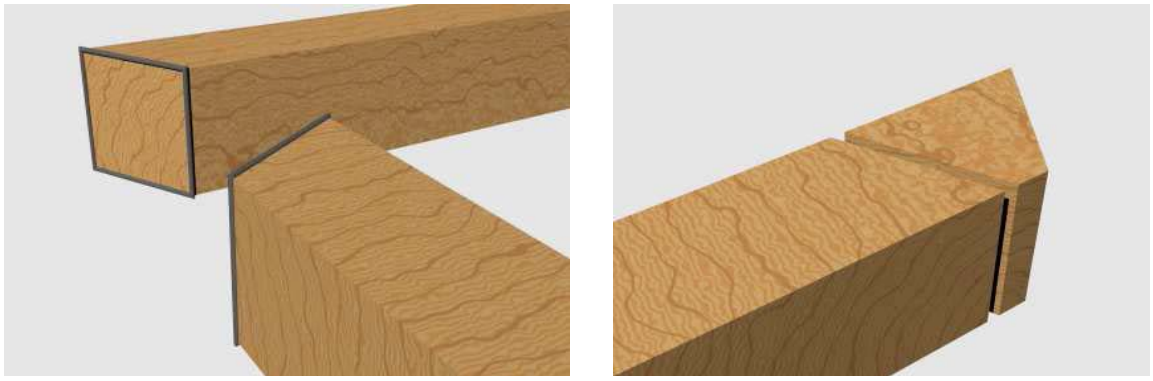


Figure 3 a,b: *Second module where the cross section is a square*

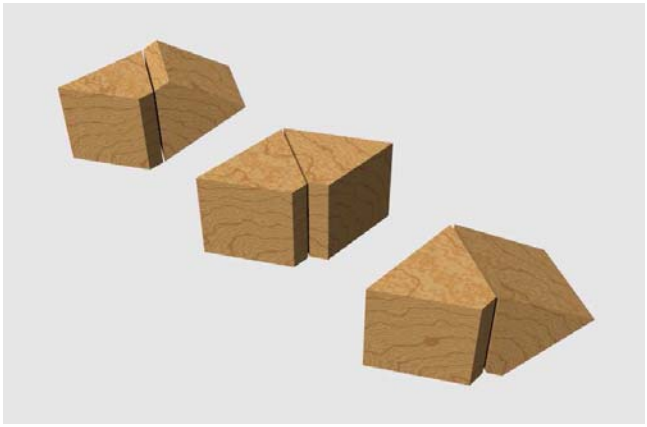


Figure 4 a: *A 90º, 180º and 270º turn*

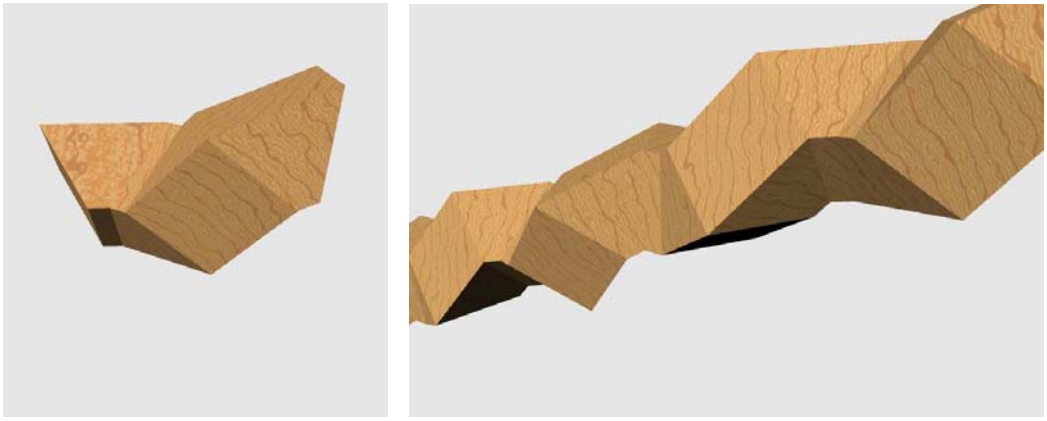


Figure 4 b,c: *A constant clockwise turn of 90º with each module.*

2.3 First sculpture with the second module. The purpose of studying and developing these modules was to make sculptural constructions out of them. The first result was “Monument for the sea”, shown on figure 5, which was still a mix of different artistic ideas as the modules were not used on their own but combined with an organic form base. The five ‘waves’ of the sculpture were constructed by using 9,11,13,15 and 17 identical modules.

Figure 5: *“Monument for the sea” (1991), varnished wood, 2.42 x 2.57 x 2.13 m.*

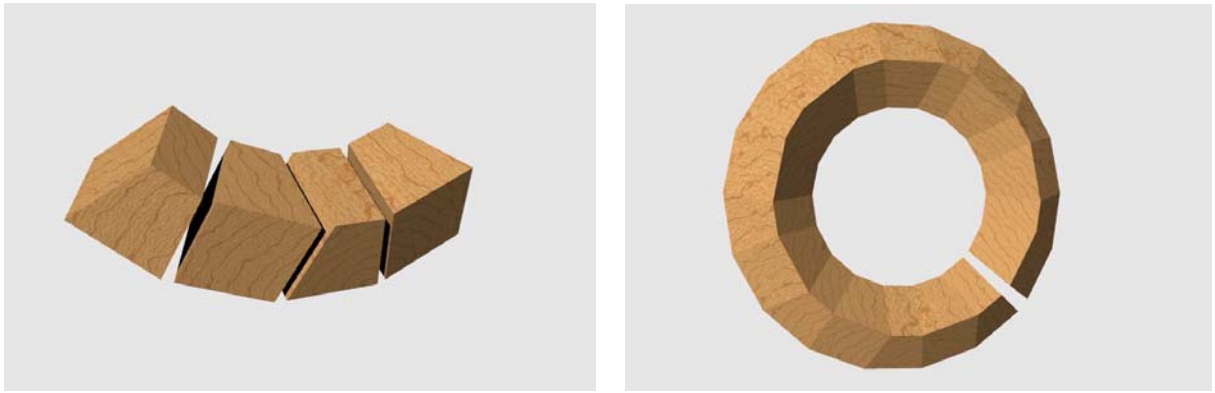


Figure 6 a,b: *An alternative combination of the second module. First 4 pieces, then 18.*

2.5 First purely module-based sculpture. One year after graduating I applied for a Public Art commission for the entrance of a residential area in the city of Heemskerk (NL). Upon the invitation to make a sketch, I knew I wanted to apply these modules I’ve been studying and create the sculpture entirely out of these modules. I started making combinations out of the ‘twisted beam’ and the ‘circular form’. The possibilities of assembling these modules were more surprising than I imagined in advance. The rather flat circle became

very interesting the moment I combined it with another identical circle, as shown in figure 7a and the twisted beam formed the perfect conclusion to it (figures 7b and 8). The final realization of the sculpture was made of two identical structures composed out of 72 identical modules each. Because of the limited space at the location, the choice of the cutting angle for the module was very critical. Finally, 14º resulted in the ideal angle.

Figure 7 a: *Two circular forms joined together* **Figure 7 b:** *Final design for "Coming and going" – top view*

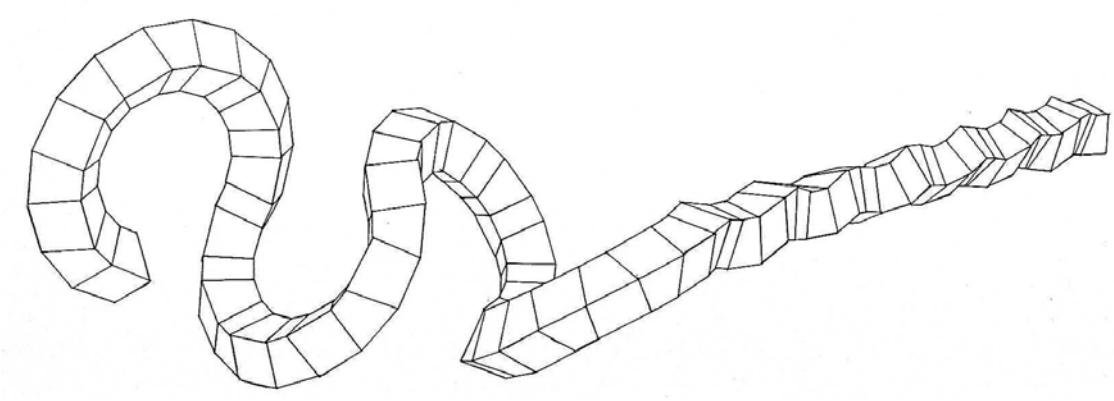
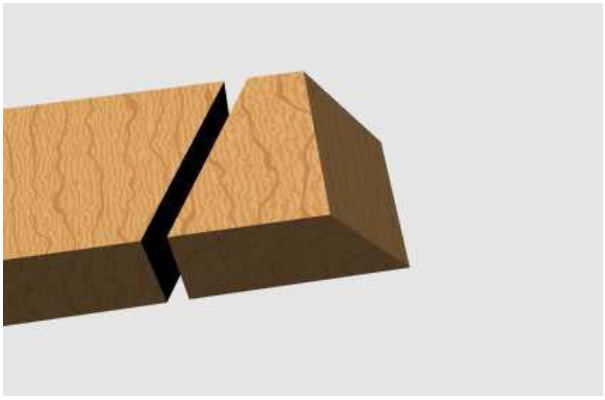


Figure 8: *Final design for "Coming and going"*

Figure 9: *"Coming and going"(1992), coated steel. Two times 72 identical modules. Size of each sculpture: 2.35 x 10.20 x 3.80 m.*

3. Third Module

3.1 Production of the third module. On the aesthetic level the sculpture I made for Heemskerk was a success, on the practical level it was not. To have this square section in my modules I couldn't simply cut square beams but had to make the 144 modules out of 4 steel plates each, resulting in a total of 576 plates, which was very labour intensive and expensive. I realized I had to look for a new module which could be cut out of a square beam, but which also would give me the possibility to create three-dimensional forms as the second module did. Such a module would also enable me to make sculptures of monumental size in a less expensive way. The module I was looking for turned out not to be one, but two. Going back to the first module, I made the second cut under the same angle but in a different direction as shown in figure 10a. By doing the same, but in mirror image, I found the other module (figure 10b). To be able to recognize the two different modules I started calling them 'left' (L) and 'right' (R) as for the direction they point to.



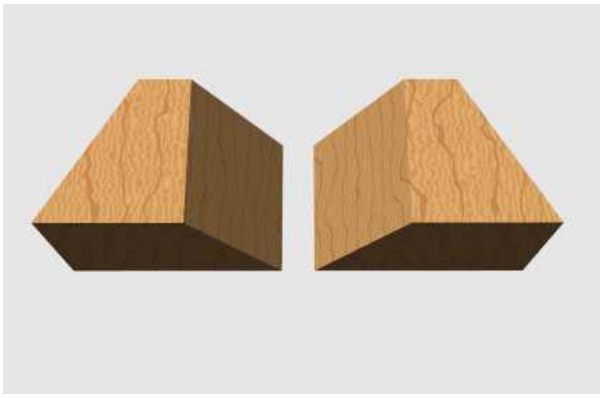
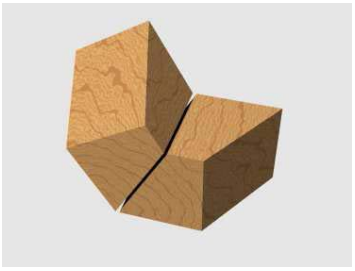


Figure 10 a: *The third module* **Figure 10 b:** *The 'left' (L) and 'right' (R) module*



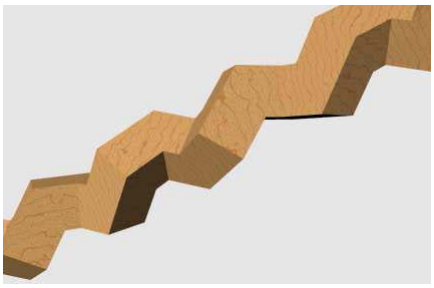
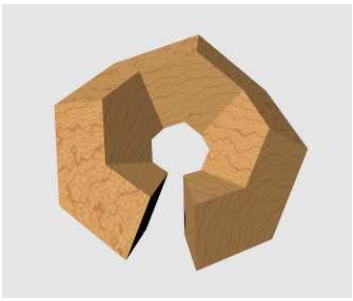


Figure 11 a: *L and R - module* **Figure 11 b:** *Two R - modules* **Figure 11 c:** A series of *R - modules*



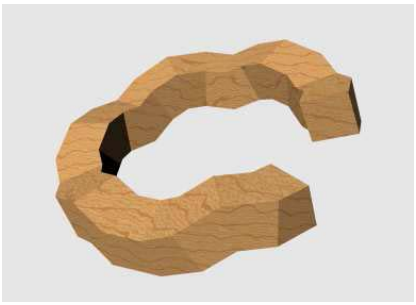


Figure 12 a: *1L - 1R combination* **Figure 12 b:** *2L - 2R combination* **Figure 12 c:** *3L - 3R combination*

3.3 More Public Art sculptures. With these new modules at my disposal, and their possible combinations, I made a series of works over the next years, both monumental and small. Figure 13a,b show the sculpture "Meeting Point", made on commission of the city of Zevenaar (NL) for the playground near a school. As shown in figure 13a, it is built up by two identical forms, both made of combinations of 2L and 2R modules (the small circular parts at the end) and 3L and 3R modules (the big circular parts). The arrow indicates where the change from 3-by-3 into 2-by-2 takes place. Calculations about the strength and stiffness of the sculpture and the quality of the foundation were made by an engineer, as in the case of all my monumental sculptures. This technical help turned out to be essential in the process of constructing "Teamplay" (figure 14) and especially "Sign on the wall" (figure 17).

Figure 13 a,b: *"Meeting Point" (1996), coated steel. Two times 54 modules. Total size: 2.25 x 5.50 x 4.70 m.*

Figure 14 a,b,c,d show the sculpture "Teamplay", made on commission of the city of Meppel (NL) as a landmark near a sports hall. I used the modules to create a dynamic sculpture, again made of two parts, the higher one 'twirled' into the lower. As you can see in figure 14a it is built up by half circles made of 9 alternating R and L modules, finishing on top in a series of L modules.

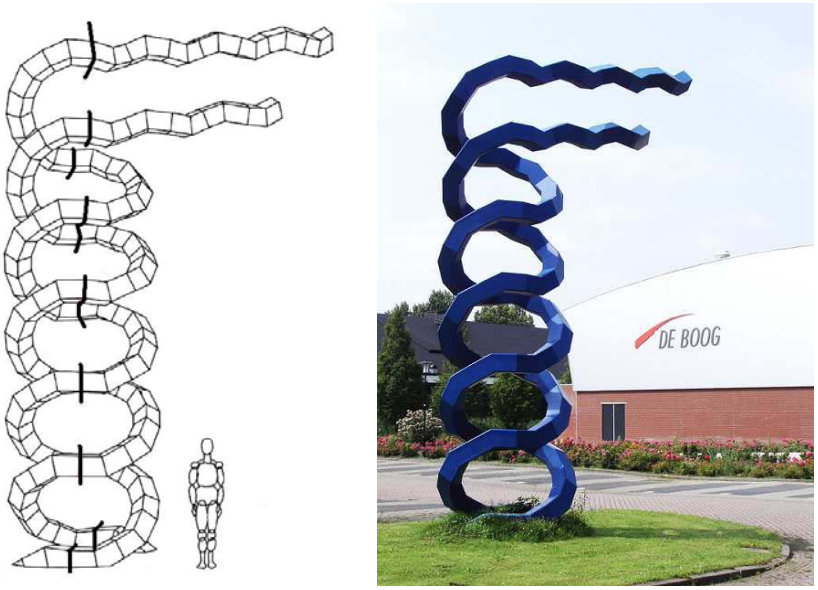
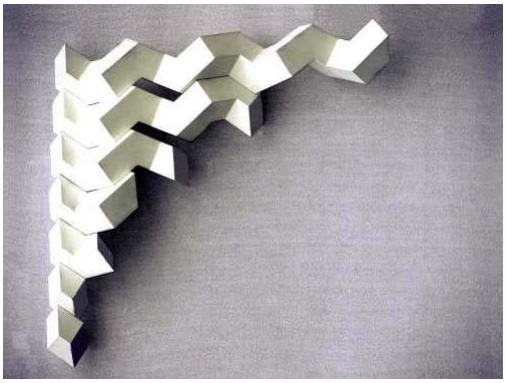


Figure 14 a,b: *"Teamplay" (2000), coated steel. Total of 139 modules. Size: 7.65 x 2.15 x 1.60 m.*

Figure 14 c,d: *"Teamplay" (details)*

3.4 The modules and Fibonacci. Because of my preference to a systematic construction of my sculptures it was only logical I would sooner or later try to use the Fibonacci numbers in a next step of the development with my modules. Figure 15 shows the first attempt by simply using the numbers 1,1,2,3,5,8,and 13 for the successive amount of R modules. Figure 16 is a draft for a sculpture to be realized in Corten steel. The right part is built by combining L and R modules using the Fibonacci numbers: 1R, 1L, 2R, 3L, 5R and 8L. The left part is the mirror image of that.



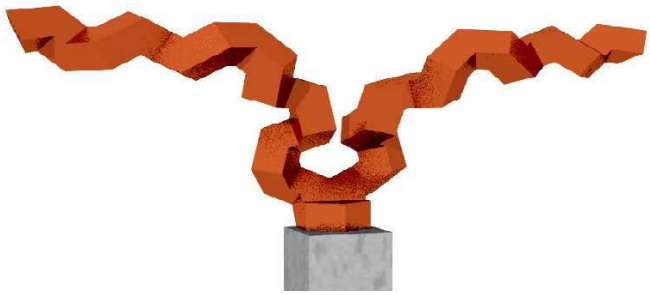


Figure 15: *"Ritmo - 2" (2006)* **Figure 16:** *Design for the sculpture "Fibonacci Swing" (2008)*

4. Further Developments with the Third Module

4.1 Changing the angle. So far each sculptures with the new R and L - modules was created with modules cut under the same angle. After a period of time I needed a new impulse: I wanted my sculptures to have an interesting, less regular 'development' within them. The stimulus came when I was asked to create a new sculpture on commission for the city of Meppel (NL) near the entrance of a municipal building. Since the building itself was a very dull 'box' I thought it might be a good idea to put a spiral form next to it as a contrast. From my experience with the first Public Art work, where I experimented with the cutting angle in order to make the sculpture fit in the limited space, I thought that by changing the cutting angle in a constant

way a spiral could be made. I started experimenting with this principle in a systematical way by increasing the cutting angles of each module by 1º at the time, alternating L and R modules.
This worked well until I reached the angle of 15º. As I saw it wasn't developing anymore as I wanted, I discovered by trial and error that I had to increase the angle by 4º for the last 8 modules, going from 15º/15º to 31º/31º. Figure 17a shows the construction with * marking the point where the angle is increased.
Because of the fact that Corten steel is only produced in sheet forms, this sculpture is made of modules that had again to be constructed from 4 pieces of metal each. Purely for esthetical reasons I added a straight part on top with a half cut off end, in stainless steel, so it would glint in the sunshine.
Thanks to the technical help of the engineer I worked with, the sculpture could stand on its own without a connection to the building, by using thicker material on the lower part of the sculpture and by an improvement of the foundation.

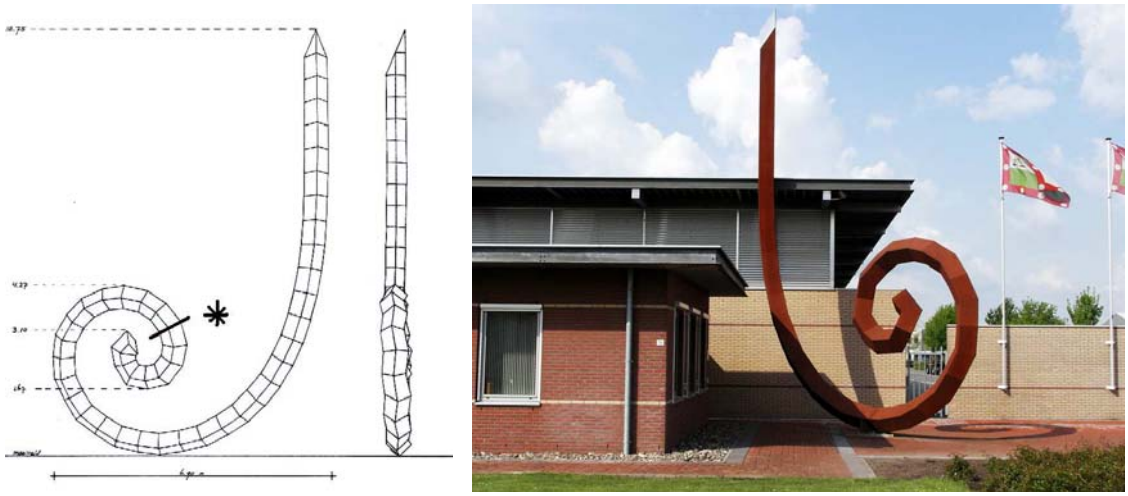


Figure 17 a,b: *"Sign on the wall" (1998), Corten steel. Total of 44 modules. Size: 10.75 x 6.90 x 0.57 m.*

As a direct result of this, some of my next smaller sculptures were based on the sequence of cutting angles, as in the 'curliest part' of the spiral. Figure 18a shows that part of the spiral form and figure 18b,c are built up of the same two spiral forms (twice 27 modules) but connected in a different way.

Figure 18 a,b,c: *A part of the spiral form of "Sign on the wall" (a) and two combinations with i*t (b,c)

Another sculpture, deriving from “Sign on the wall” was a combination of four times its last 9 modules (from 15º/15º to 31º/31º) as in figure 19a. The first version of this sculpture, titled “Surrender”, was made in stainless steel during a symposium in Comitan (Mexico) in 2006. The second one, in Corten steel, was part of an open-air sculpture exhibition in the summer of 2007 in Sirmione, at lake Garda, in the north of Italy, as shown in figure 19b.

Figure 19 a: *9 modules*

Figure 19 b *“Surrender”(2007), Corten steel, 2.10 x 1.50 x 1.90 m. Constructed of 4 times the 9 modules of figure 19a.*

4.2 “Rhythm Sticks”. Another decision for a systematical approach to make a sculpture was a series of vertical ‘sticks’ in which the movement increased by augmentation of the cutting edge by 3º, 4º and 5º. The latter would transform in 9 steps with R modules from 0º/5º to 40º/45º, and in 9 steps back again to 0º. The result of the three of them, as in figure 20, is a good illustration of the result of an increasing change of the cutting angle to a straight beam.

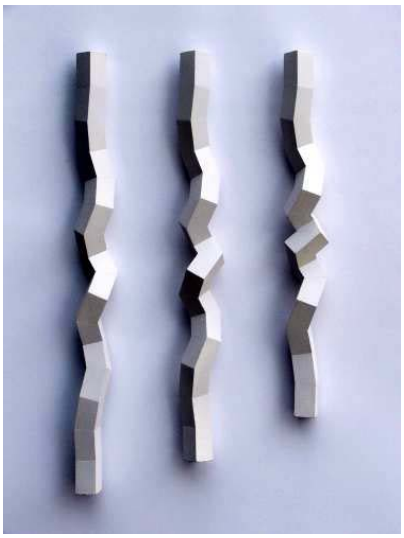


Figure 20: *“Rhythms Sticks 3,4 and 5” (2006)* **Figure 21:** *“Rhythm Stick 5” (2008) Corten steel, 2m. high*

5. Modules not Connected on the Cross Section

The basic idea that was behind the creation of "Rhythm Stick 5" formed the principle for a new series of sculptures. The difference was that the modules were not anymore connected on the cross section, but on their sides. The first one (figure 22) was created by using two times nine R modules, with angles increasing by 5º from 5º/5º to 45º/45º. The result was an arch-like form, whose two parts almost touch on top (hence the title). Figure 23 a,b show soon to be made alternative, rearranged versions of the same 18 modules.

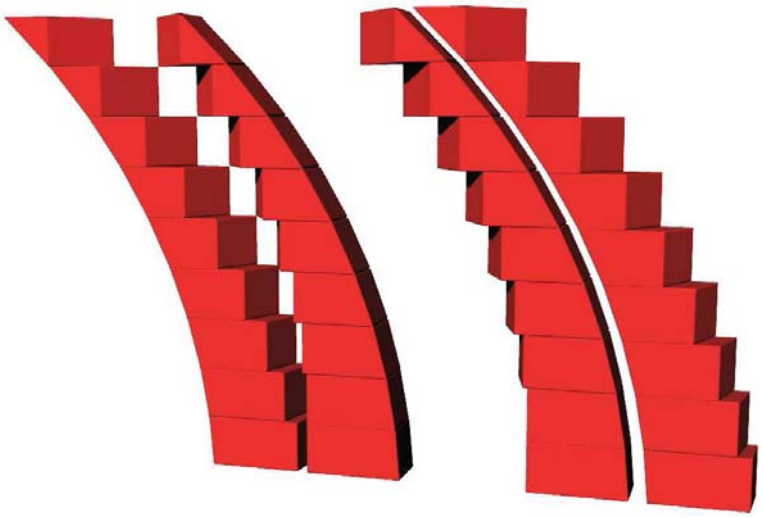


Figure 22: *"Cheek to cheek"(2008), Corten steel.* **Figure 23 a:** Project "Inversion 1 and 2"
Size:3.40 x 4.00 x 0.38 m.

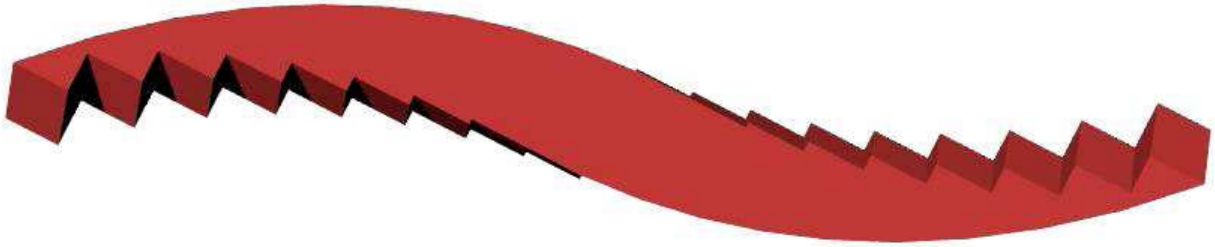


Figure 23 b: *Project for the wall sculpture "Wave"*

6. Conclusion.

For many years I have done research on the use of combinations of the modules as described in this article. Even though I liked trying other sculptural approaches too, I kept going back to these modules, discovering new possibilities every time. Luckily I still do. Maybe it's also because of the fact that, as much as I really enjoy applying certain rules in the process of creation, and as much as my sculptures are mostly the outcome of that purely systematical approach, many times they are also the result of a mere play with forms.

The following images have been created with the use of Rhino 3D: 1,2,3,4,6,7,10,11,12,16,18a,19a, and 23. Special thanks to Rinus Roelofs for introducing me to this great modelling program.