Le hang a été créé au tournant du millénaire à Berne (Suisse). Le son de cette nouvelle sculpture sonore en tôle a fait le tour du monde. Ses inventeurs, Felix Rohner et Sabina Schärer, donnent un aperçu détaillé de leurs travaux de recherche et de développement sur la sonorité de la tôle, qui les a conduits à une nouvelle sculpture sonore, le gubal. Le CD ci-joint donne les premières impressions sonore du gubal.

PANArt

hang Sculpture Sonore

hang

Sculpture Sonore

bang

Sound Sculpture

PANArt since 1993

Imprint

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Contents

Dear reader:

PANArt Hang Manufacturing Ltd. has turned twenty.

On this occasion, we are pleased to give you an insight into our work. We would like to present contexts which are not readily evident from an external perspective since our work between culture and economy eludes in some respects the familiar and established.

The musical instruments we build do not belong to just any tradition. Sheet metal, particularly our pang material, invites another kind of work. We build instruments which are, in a sense, mirrors. They make people confront themselves, their innermost. They work as tuning devices which attune the player or a moment; as seismographs that reflect conditions; as spotlights that throw light in hidden corners. They reveal in a gentle, precise and clear manner.

Our company has now existed for twenty years — nothing to be taken for granted in the culturally fast moving and economically rough times we live in. We thank the many people who have contributed with their knowledge and skills to this success. In all these years, many people have held in their hands an instrument built in our home with passion. This wide response fills us with joy.

Felix Rohner and Sabina Schärer

From the pan to the gubal

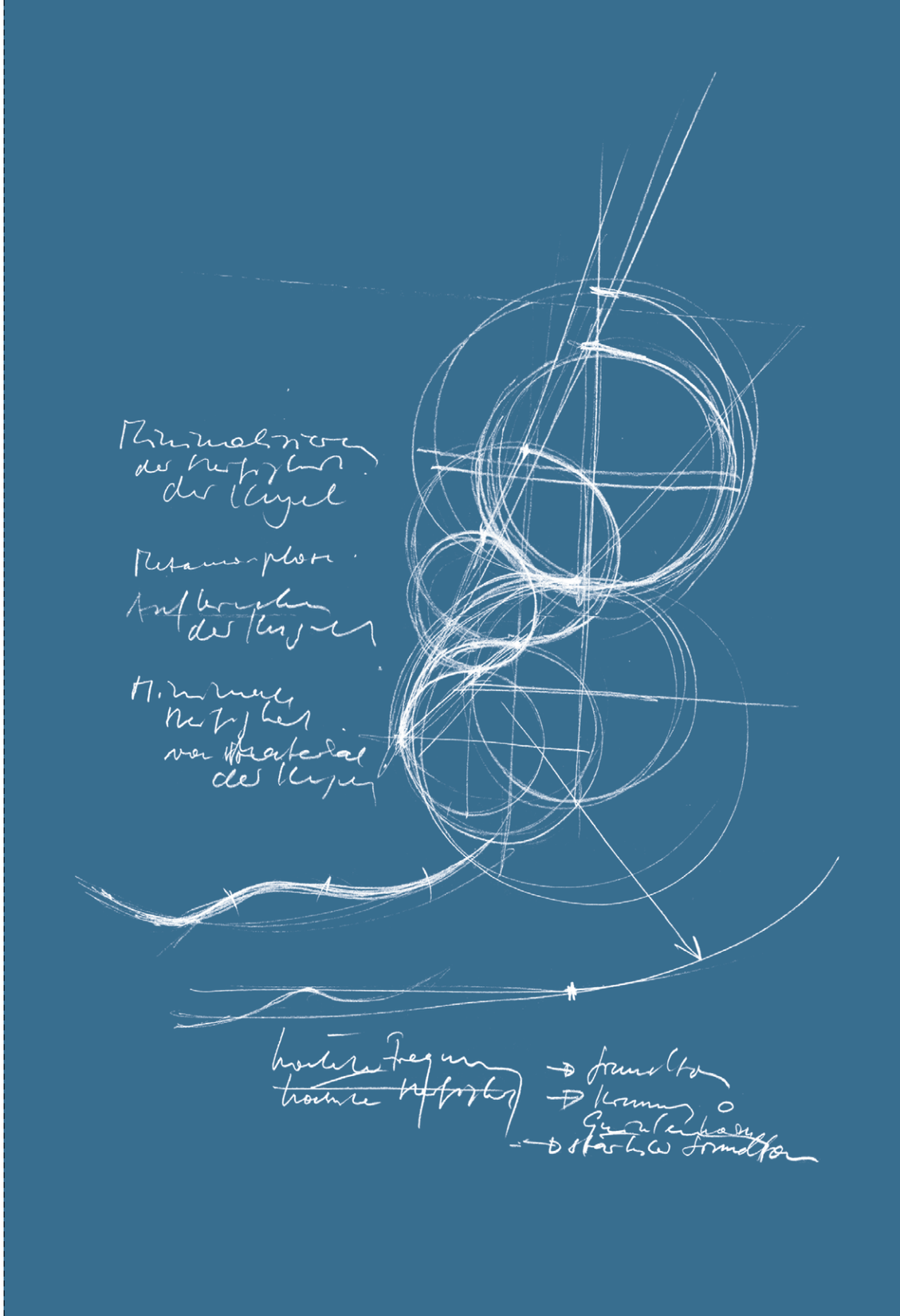
In May 1993 the *"PANArt Steelpan-Manufaktur AG"*, founded by Felix Rohner and four members of the steel band *"Bernese Oil Company"*, was officially entered in the trade register.

The company sees itself as a background for the numerous steel bands in the country who are constantly in need of good, stable steelpans and serious tuning services. In August 1995 Sabina Schärer joined the firm. From its beginning, PANArt invested heavily in the research of different types of sheet metal, processing methods, and in different technologies for forming metal.

The first raw form was tested in September 1995: a mechanically deep-drawn form of a composite called pang. Thus, PANArt moved away from the traditional way of making steelpans and focused on the development of instruments based on pang material. Subsequently, the instruments ping, peng, pong, pung, pang bells, orage, and tubal were born. In the year 2000, the complete range of pang instruments was exhibited in the special show "Exempla" at the International Trade Fair in Munich, and received the Bavarian State Award for special technical achievement.

In 2001, PANArt introduced the newly developed hang to a broad public at the Frankfurter Music Fair. From this moment on, their entire work focused on this one instrument. That is why in the year 2003 the company's name was changed to *"PANArt Hang Manufacturing Ltd."*. Over the years, the two hang makers produced a total of about 7,000 hanghang. They were far from being able to satisfy the rapidly increasing demand. In 2006, PANArt stopped its sales through music shops and other distributors and began to sell the hang directly and only locally. In 2007, as speculation over the instruments built by PANArt began, prices reached absurd levels. Thus, PANArt decided to draw up written agreements with its buyers stating that they will not resell their instrument at a profit.

The annual hang pause, a time of focused research, playing, and rest, is a precondition for the continuous development of the hang. In the year 2010, the hang makers freed themselves from the standard 440 Hz and from tuning devices. Today, each Free Integral Hang is attuned to itself. On the occasion of the 20th anniversary in June 2013, a new instrument will be presented: the gubal.



The sound of sheet metal

Since man first began to extract metal from mineral ores, he has known the sound of this material. Whether in front of the stove or in battlefields, the sound of metal has always accompanied mankind. Sacred rituals under the sounds of gongs, cozy reunions accompanied by the sound of spoons against copper vessels, wild tumult of screaming people, snorting horses, and clanging armors — all of this was the sound of metal in magical and mythical eras.

Sheets of bronze or copper have been resounding since times immemorial in artfully worked cymbals, gongs, bells. For its part, steel sheet acquires a real presence only through the interaction with hollow space. The sound of a car door is the signature of the quality of the vehicle; the sound produced by opening a can of sweets reveals even without looking how empty the can is; striking a container is sufficient to estimate how much fluid it still contains. And with blows against empty cans, people also protest loudly or express their anger.

The introduction of machines that could roll metal opened the door to the quick and cheap mass production of containers of steel sheet. The sound of steel spread around the world: people fed themselves from canned food, edible oil was in containers, biscuits in tins, sailors piled metal drums, soldiers rolled containers full of oil and kerosene. The empty barrels that the British and Americans left in their military bases in the Caribbean during World War II became the raw material for creating an artistic form of music, of which their creators are justly proud: the steel orchestra of Trinidad and Tobago. It was not only with enthusiasm that the first bands which used all kinds of metal containers in their drum groups were received in the streets of Port-of-Spain. For the bourgeois middle-class population this was a provocation: they heard strident, chaotic, nerving sounds — and thus feared that the traditional order was being threatened. Thanks to the specific forming of steel sheet from steel drums, a harmonious shape developed step by step. A shape which, combined with the fast rhythms, transformed the steel band into a cathedral.

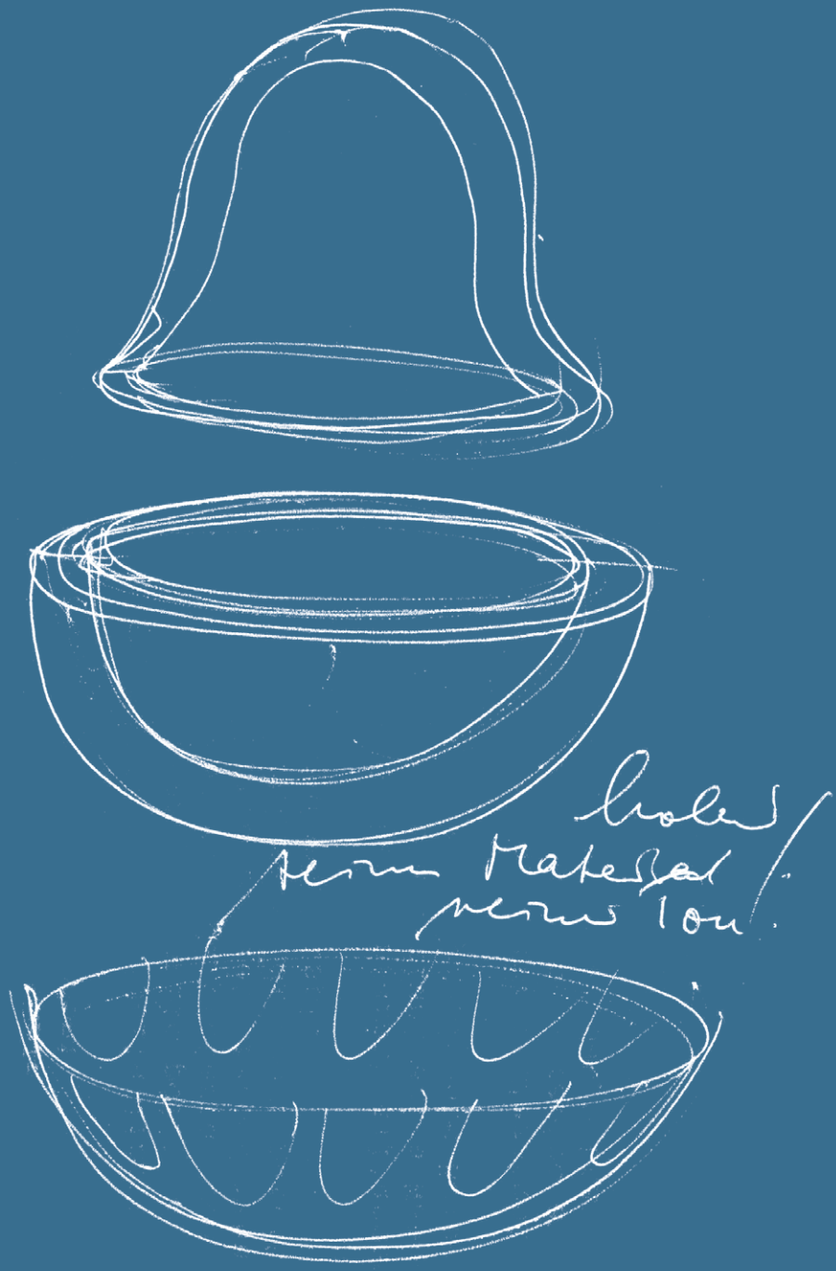
In the fifties, in every district of Port-of-Spain there was a “pan yard” where the steel bands gathered to practice. Every time they practiced for the upcoming carnival, the huge resonance body resounded in the whole city. Since the tuners’ understanding of how to brighten the sound of steel by hammering tension into the material improved continuously, the music became more energetic from year to year. The overtones became stronger, the whole group of instruments began to sing, to vibrate intensively, and in the lower levels the bellied basses droned, producing a groove that could make any person dance. The orchestras, which often numbered up to a hundred musicians, were musical volcanos that produced a thrilling rondo sound of almost hymnal amplitude. In the days preceding the carnival, they matched each other in the so-called Panorama Competitions, and during carnival they played in the streets to the point of exhaustion.

In the early fifties, the first steel bands in England were created, in the sixties they had already reached the continent, and in 1976 they arrived in Switzerland. The gift that the steel bands brought into the world was gratefully welcomed everywhere. The audience felt invigorated, the appeal of the steel sound electrified it: people began to dance and a strange undulating physical sensation gripped all who indulged in the rhythm. The sound of the steel band thrilled groups of people as a whole, attracted them, put a spell upon them. In this rich world of sound, everybody could hear what he wanted — violins, trumpets, choirs, songs, and anthems.

In Switzerland it soon became clear that the liberating euphoria of the seventies and the eighties had created an ideal basis for the steel pan. Soon nearly 250 orchestras where born, especially in German-speaking Switzerland. But this also gave rise to new needs. Better tuned instruments were in demand, as there was a lack of tuning devices. PANArt’s path led through science, acoustics, metallurgy, mechanics and architecture to a completely new kind of sheet metal better equipped to meet the demands. With the construction of steel pans in Switzerland began also the dialogue with this peculiar gift from Trinidad. A process of workmanship and development led to new insights.

The discovery of a new method for strengthening the soft steel sheet opened a door to a new dimension. We began to play the hang by putting it on our laps — and we put away the drumsticks. The spherical shell of our high-energy pang called for another way to transmit its energy. The hands, which can stimulate in a more differentiated and versatile manner, became the most suitable form of playing the sensible material. The intimate and direct way of playing led to an internalization, our new sound sculpture had the ability of driving people into a flow-like state and of relaxing them. When Sabina Schärer played the hang at the *International Conference on the Science and Technology of the Steelpan* (ICSTS) in Trinidad in October 2000 in front of scientists, tuners, and journalists, the expert audience agreed on one thing: with the hang, the pan has received a sibling which will surely make its own way.

The outer form of the hang has not changed since then, but its sound has gradually become warmer. The Integral Hang had a sound richness that resulted from the vessel itself. The Free Integral Hang, first built in 2009, assumed the tuning of the Integral Hang, although in a so-called free tuning, since we realized that the hang's natural sound doesn't need any tuning devices. In this anniversary year of PANArt, the mandorla form of the hang has changed; the resounding sculpture has sunken into the player's lap, a powerful pulse resounds in the center of activity. A rich world of overtones is woven into the low sound of the vessel. We called this new instrument the "gubal".



Dealing with richness

In 1988 the *"Deutsche Arbeitsgemeinschaft für Akustik"* (German Society for Acoustics) organized a colloquium entitled *"Quality aspects of musical instruments"*. A booklet containing the minutes of the meeting, published by the acoustics expert Jürgen Meyer, fell into Felix Rohner's hands. For the young steelpan constructor an article in the booklet written by the two world-renowned physicists Thomas D. Rossing and Uwe Hansen entitled *"Modal Analysis of a Caribbean Steel Drum"* was particularly appealing. Both scientists are now retired. Rossing has written many standard works on acoustics (including *"The Physics of Musical Instruments"* and *"The Science of Percussion Instruments"*). Hansen, Rossing's longtime research partner, still lectures at Terre Haute University (Indiana, U.S.A.). Both were pioneers in topics such as the visualization of vibrating structures by means of interferometry and modal analysis. By using laser rays, interferometry allows the visualization of oscillation; in modal analysis the object is stimulated directly and the response of the material is analyzed, thus obtaining a basis for simulating movements.

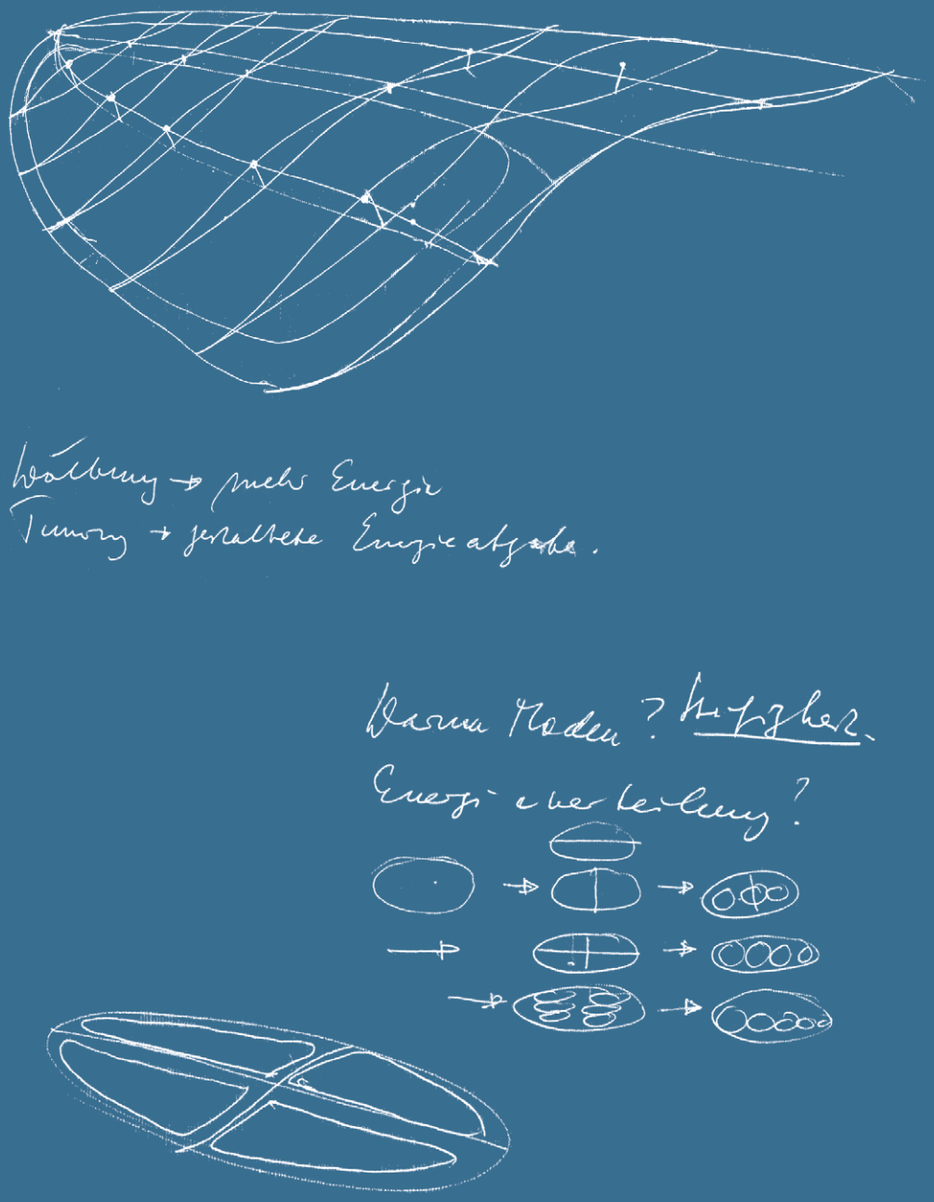
For Felix Rohner, this first insight into the elastic structure of a body made of steel sheet was a revelation. It was the starting point of a journey into acoustics and of an intense and prolific cooperation with physicists from different countries. In the course of more than 20 years, the exchange between scientists and hang makers led to one shared insight: the complex non-linear system of both the steelpans and the hang cannot be summarized in one formula. The process of working with sheet metal is only secondarily a question of handcraft. Primarily, it is a question of art.

In 1991 Thomas D. Rossing wrote that *"the sound spectrum of steel drums is surprisingly rich in harmonic overtones that seem to originate from very different sources"*. After more than twenty years of empirical and scientific research, we now know better. Today we can distinguish between seven different sources that contribute to the richness of the entire spectrum, none of which is more significant than the other. Anybody who plays the hang must be aware of this diversity and its consequences. In this way, the hang player will be able to avoid the embarrassing reduction of the hang to a strident drum, and also to escape the illusion that the hang could be integrated into Western music. Attempts of this kind have been made time and again in the past — they all quickly faded away.

In order to take account of the acoustic richness of this resonator which is capable of reactivating the inner sources of the human being, we need a new way of hearing, or rather of listening attentively. Anybody who opens himself to really listening to the hang is amazed by the immediate response of the resonator. One is never really quite sure of where the sound comes from, it just takes possession of the listener, something like magic. This immediate effect goes deep. It results from a complex acoustic incident to which hang makers refer as an "impulse". The impulse is given by the player, but at the same time the impulse gives the player energy in return. The impulse revitalizes and simultaneously soothes the body and the mind, as conscious thought is subdued. The highly strained shell responds directly and immediately to even the finest touch. And since our hands are also extremely sensitive, the interaction between hand and hang must be correspondingly gentle. There cannot be a particular technique for this process. There is no string to be plucked, no skin to be put into oscillation, no air column to be blown into. Playing the hang is a path — a path that leads to oneself.

The Free Integral Hang is a generous invitation to everyone. Its sound spectrum is dominated by an enormous richness of overtones that enchants both player and listener. The sound of the hollow vessel (the gu) can be heard, but it does not play a central role. This has now changed with the gubal. Our new instrument is more voluminous and in place of the ding in the Free Hang, there is now a hand-wide opening with a short neck curved inwardly. On the underside there is a gugel which sinks well into the lap of the player. By varying the angle of the legs, it is possible to influence the duration of the fading sound.

At the center of the gubal sound one can hear a deep bass note, the gung. The gung is a gentle pulse complemented harmoniously by the ringding, which can make the gung resound in manifold ways. It has a frequency of 78 Hz (440 Hz at concert pitch), which corresponds to Eb2 and may be reduced to Bb1 through the right handling of the gu opening. The ringding enriches the Helmholtz tone through the tuned overtones of the octave, the fifth and the double octave. Bright percussive sounds that spring forth on the “shoulder” around the gung remind us of the South Indian instrument ghatam or of the brake drums in steel bands. A harmonically tuned tone ring, which offers the player a wide range of tonal material, crowns the gubal like a choir. With a volume of just over 70 dB, the gubal is located in the volume range of the human voice. Any attempt to play louder leads to distortion. It is through intuitive, almost unintentional playing that the gubal unfolds its grounded essence: the groove.



Sources of richness

The sources of richness are about physics. It does not matter which one of the seven sources is mentioned first, since by playing we enter an indivisible totality. Each source contributes to the whole. It is with this knowledge that one should play the hang and the gubal. To ignore or even to repress this richness leads to a kind of impoverishment that virtuosity or cheap effects can only conceal superficially.

Contact

The contact with the playing surface produces a typical noise. It stems from the briefly displaced air by the hand. It is there every time the surface is touched, immediately before the energy makes the shell resound. The richness of this contact cannot be described in words.

Cosmos

When parts of the hand meet the shell, it is possible to hear the overall sound of the resonator: a cluster sound that embraces all that can vibrate. When playing the hang, this basic sound is always present. This richness constitutes the instrument's spherical virtue. A well-trained ear can analyze the sound and distinguish the different frequencies. The stronger the stimulus, the louder the swelling of the cluster. A Dionysian, discordant world emerges from behind the harmonious fullness. It is no coincidence that modern physicists began studying the chaos theory by examining the sound produced by steel (Anthony Achong, ICSTS 2000, *"The Pan on the Way to Chaos"*).

Chorus

The hammering of the hang maker creates energy reserves, also called vibration modes, that relate to each other harmoniously. In each individual tone field, its overtones are: the fundamental note, its octave, and its fifth above that octave. Additional vibration modes are spread through the dome in higher regions of the spectrum which strengthen the harmonic impulse. The prestress in the vibrating shell determines where the energy of the player flows when he stimulates one or more of the vibrating modes.

This process is called the shifting of energy. The prestress determines the efficiency of the shell and how the energy is shifted through the vibration modes and how it finally fades away. This fading away is decisive for the beauty of the tuning, both the art of tuning and the effect of the instrument depend on it. The laws determining these processes remain to a large extent a mystery to experts in acoustics; however, they are the hang maker's daily bread.

Depending on where the player stimulates the instrument, certain overtones will be produced and the sound will change its character. This variation of timbre is the typical feature of this family of instruments. It constitutes a richness that cannot be mastered, since this tonal range can only be found through intuitive playing. Each new stimulation is unique.

Coupling

Furthermore, the acoustic incident is enriched by a coupling process. The hang makers have carefully tuned tone fields which are related to each other. How is this achieved? If a player stimulates a tone field, the vibrational energy resounds in the whole shell, similar to how the energy flows from a string over the bridge into the resonator. Thanks to specifically designed conditions, the energy is directed to tone fields in the shell that all have the same frequency. These resonances build up and radiate. They can even be located on the opposite side of the instrument, depending on the material and on its sound-absorbing characteristics. Our pang material is an excellent energy channel, showing only a slight damping effect.

The harmonic coupling contributes decisively to the particular radiation, and subsequently to the impact of the hang. The congenial diffusion of vibrational energy within the whole shell — determined by the prestress — is a part of the same context. During the many years we have been searching for a rich tone (choir), we hang makers have created a balanced phrasing. In the same way as the string only works under tension, the hang should also be subjected to tension. Restraining the tone field and its critical curvature in which energy is reflected is the alpha and omega of making hangs.

Overtones

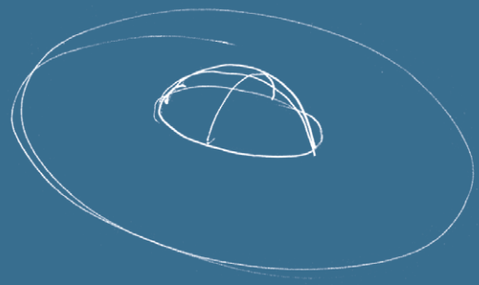
The harmonious fullness of the hang's sound comes from harmonic overtones, which result from the non-sinusoidal motion of the tone fields. The shell doesn't oscillate evenly: the peak oscillation creates tension, the downward oscillation results in pressure. Similarly to the case when playing a string, this leads to natural harmonic overtones. The intensity of the overtone vibrations depends on the curvature and the thickness of the steel sheet. Up to a dozen overtones can develop. The advantages of our pang material are also evident here: our metal is more rigid and correspondingly can generate more overtones.

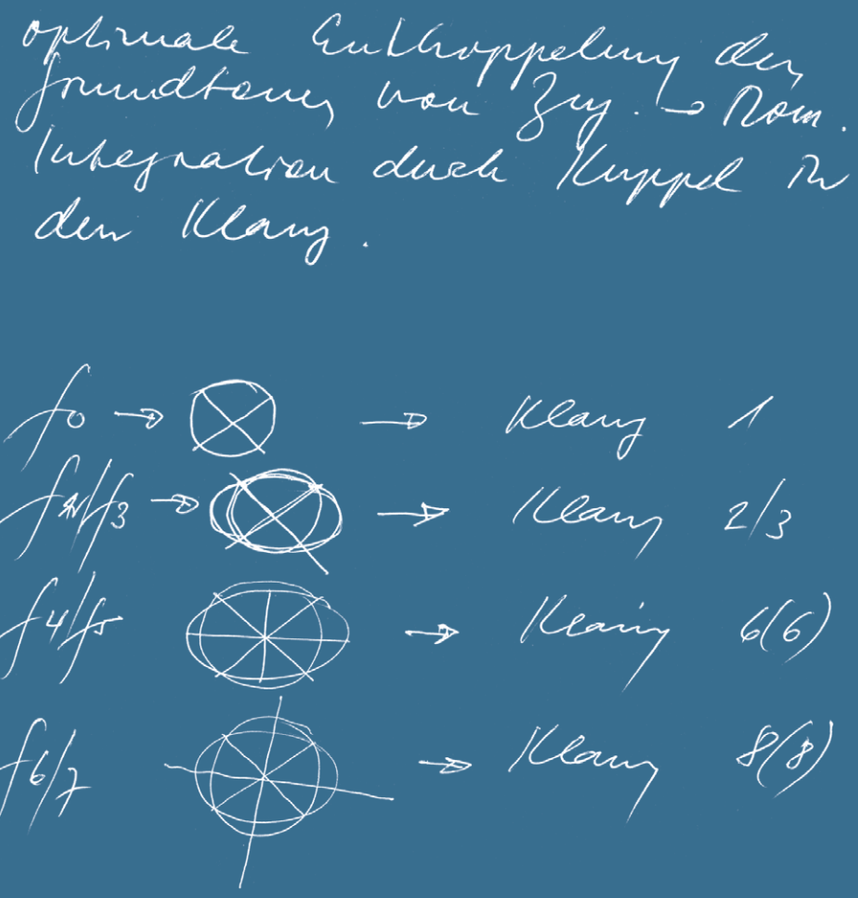
Neighbors

The more vehement the playing is, the louder and brighter the sound impulse will be. At the same time, there is an indirect mechanical stimulation of the nearby tone field which increases the disharmony of the impulse. Thus, the highly non-linear behavior of the resonance system is expressed even more clearly. The richness of the hang and the gubal unfolds only under moderate, cautious impulses. If one is looking for chaos, he had better knock at someone else's door.

Helmholtz resonance

The hang is a vessel, a kind of vase with an inwardly curved neck. The cavity of this vessel will resound once the vessel wall is stimulated anywhere. It also resounds when one blows across the gu opening. Just like when blowing across the top of an empty bottle, the air contained in it begins to vibrate and causes an air shaft to swing back and forth in the neck: the sound of the Helmholtz resonance. If the hand stimulates the air shaft directly, it will resound loudly. In the case of the hang, this resonance has a frequency of about 85 Hz and can be detected in all spectrums of the hang's sound. Whoever listens carefully always perceives it. An appropriate positioning on the player's lap can lower the resonance to the ding's octave (74 Hz). Due to its larger volume, the gubal features a stronger and deeper Helmholtz resonance.





Our pang material

What qualities does sheet metal need in order
to suit the hang maker?

— Under the hammer blows, the material has to change,
become stronger, more rigid.
Our pang material does this.

— The hammer blows should produce a highly elastic strain.
In the case of pang material,
this strain is achieved to a high degree.

— Under the hammer blows the forms should set in order
to retain their shape and not break while playing.
The pang material allows the method of presetting.

— The material should have a high restoring force
to avoid sound distortion and to provide elasticity
or a rebound to the impulse.
Pang material does this.

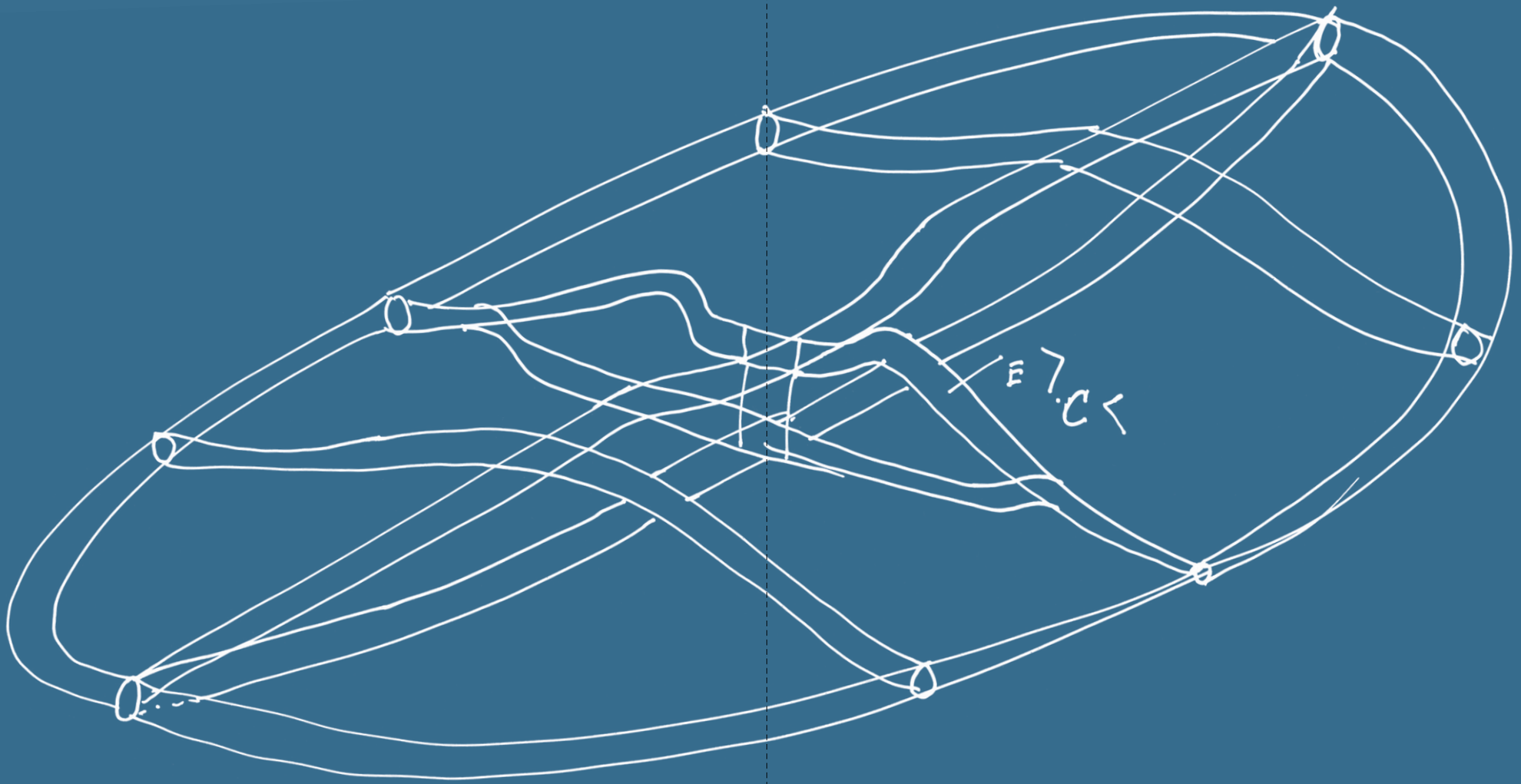
— The material should be able to withstand the high pressure
of the restrained tone fields.
The pang material features both a high mode of elasticity
as well as a high tensile strength.

— The material should not absorb energy;
its damping level should not swallow the impulses.
The crystalline structure of pang reduces the absorption and
allows for an essentially faster bending wave energy.
This is quite important for the intensity of the tone impulse.

— And finally, the material should have a surface
that feels good to the bare hands.
The ceramic nature of the pang has such a surface.

The origin of our pang sheet is fine steel sheet containing a relatively soft ferric crystal matrix in which nitrogen will diffuse at an oven temperature of 580° Celsius. When nitrogen combines with iron, it forms hard nitride crystals, thus producing a high-strength metal matrix composite. In 2010, a one-year research project co-financed by PANArt was launched at the University of Applied Sciences in Biel (under the direction of Jean-Martin Rufer and Jürg Dänzer) to lay the groundwork for a patent application.

The art of forming sheet metal can be compared to dancing: neither partner may impose his movement upon the other. They practice together every day and get to know each other. Pang is a good partner. It leads gently and inconspicuously.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From tone field to tone landscape

With the steelpan, Trinidad planted a strong impulse in the world — and was well aware of it. They called it *"a gift to the world"*, and it is indeed a gift. People throughout the whole world have been captured by the exotic sound of steel bands. Some even reached out for the hammer to better understand the phenomenon. They bought steel drums, beat the bottom into convex and concave landscapes and then arranged these in a tone system. Steelpan orchestras were created here and there and tackled the collective challenge of converting the new sounds into music. No easy task, as this art form demands discipline and skill. The player's mallets do not just hit the tone field in just any place. Only if the *"sweet point"* is struck is the melodic phrasing the right one, is the complex rhythmic harmonious, does the music enter the listener's body.

Only if this interplay is practiced patiently can the orchestra become a close-knit community and lift off: the ego is left behind, individual limitations seem to disappear, the musicians seem to melt with the audience, a spiritual adventure is in the air. Europeans are usually not very good at dealing with such magical sounds and energies. They have, if any, their own idea of what it means to become empty. And yet, Europeans let the art form of the steel band enchant them. This process, however, was not really a sustainable one. The steel band is an organism that relies heavily on a continuous energy supply, and this supply dried up in many European bands. The groups burned out, the instruments are dusty and rusting away. Most of the steel bands founded in Switzerland at the time of the boom in the nineties have disappeared.

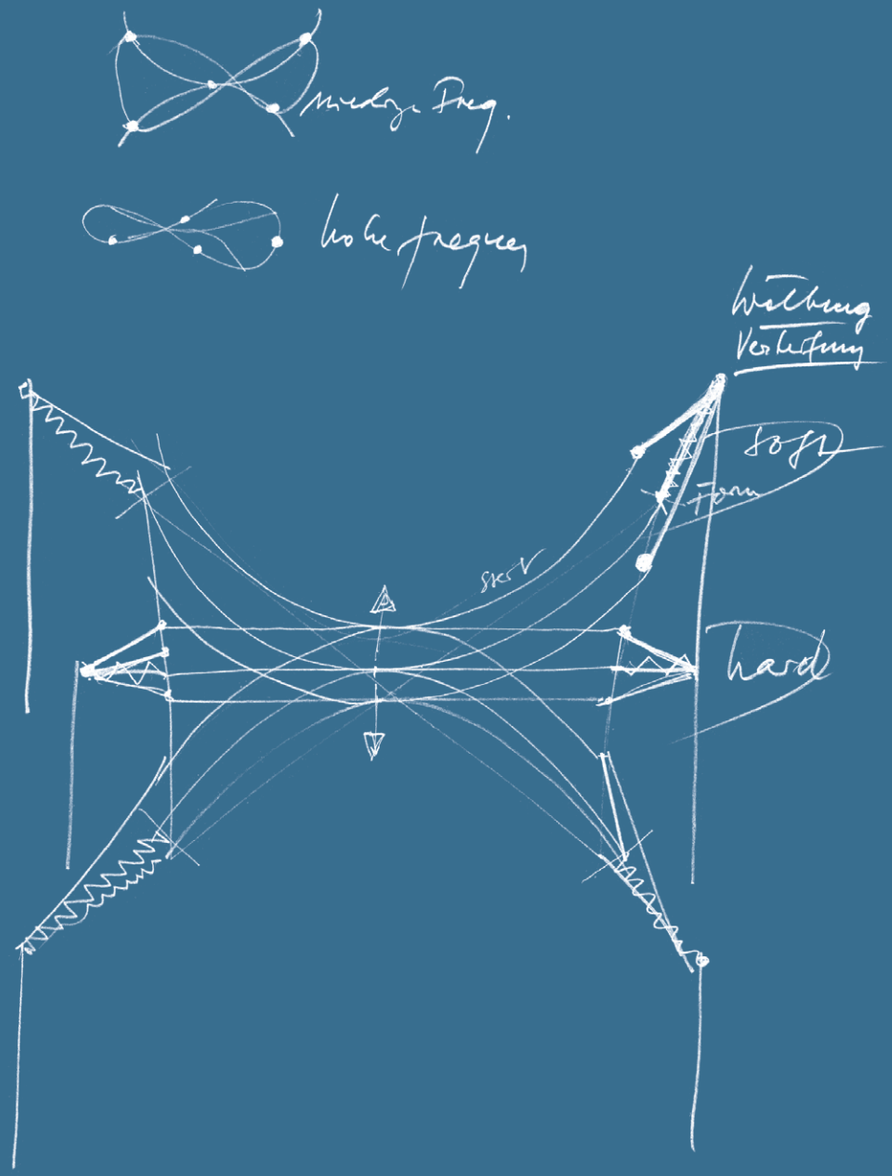
We at PANArt noticed the fatigue in the scene but decided not to give up. We began to do intense research on the sound of steel, which is often referred to by outsiders as discordant, aggressive or annoying. (*"Päng from the dent"* was, for example, the title of an article in the German news magazine *"Der Spiegel"* in 1995 about the phenomenon of the steel band). Physics, in particular insights concerning interferometry and modal analysis, as well as the study of other metal sounds, especially the musical saw, allowed us to better understand the non-linear system in its complexity. Proceeding from this assumption, it was now possible to experiment with marginal conditions. Through varying the critical curvatures, we were eventually able to influence specifically the reflection of vibrations and thus the harmonic coupling of the tone fields.

In this way, the focus shifted away from the individual tone field to the tone landscape as a whole. As part of this expanding horizon, also the artistic freedom matured beyond the traditional notions of making music. The secret lay in the matter of tension. This was a completely new approach to our work. Until then, we had understood the designing of tone fields as a synthesizing way of forming. But how should we approach the process of tension? We found the answer to this question in the theory of the strength of material familiar to engineers: the Euler buckling modes. How does an elastic rod tighten under pressure, how does a column burst, how does a bridge give way? In the three-dimensional landscape of sheet metal, the case of buckling is rather denting.

The initial point for our development of a tension method for three-dimensional sheet structures dates back to the year 1997. While building a peng instrument, a navel emerged in the center of the tone field when we buckled the shell. We discovered that this navel had a positive effect on the sound. It seemed to stabilize the wave of the fundamental tone leading to a stronger fundamental tone. Thus, more energy could be retained for flowing into the overtones. The result was a stronger coupling of the harmonically related partials in other tone fields. From that moment on, we embossed domes in the tone fields with a specially designed tool — an innovation that was met with interest by steel pan makers and acoustics experts.

The dome geometry modified the sound. It had a positive effect upon the modulation of the sound by keeping the high prestress stable. Thus, the concept of efficiency appeared, already known to us from the string. It was not only the impedance ratios which were relevant, but also the degree of prestress. Thanks to this, it is possible to alter the modulation in tone. The primary concern was not that the resonances in the tone field would relate harmonically. What was important concerning the flow into the higher vibration modes was rather the degree of applied prestress.

It was not easy to introduce this prestress. The appropriate geometry was required. In our case, it was neither about one of the well-known Euler buckling modes, nor about a lateral-torsional buckling. It was about a special buckling case. The buckling of the sphere? We could not find enough information about that in scientific literature. For this reason we focused our investigations in the field of lightweight architecture. The Swiss civil engineer Heinz Isler, one of the world's most important shell constructors, confirmed our assumption that the solution was to be sought in the saddle form. The saddle, now applied to the dome, allowed us to introduce prestress selectively in the convex/concave landscape, fundamental for a harmonic fading away of the sound. Since the dome, the saddle and tension are of such significance to our work and our instruments, we use the term the "Rohner-Schärer buckling".



Resonance in the world

The hang spread around the world instantly. The response to the new instrument was overwhelming and it could not be stopped. This was not only a surprise to us creators. After years of "silent" and lonely work in the Engehalde, more and more people from all over the world began to appear, people who had heard the hang somewhere and wanted to buy one for themselves. The instrument seemed to touch people directly and so deeply that they could not forget the sound. They wanted to hear it again and even reproduce it themselves. The apparently simple handling also encouraged people who had never made music before in their lives to play the hang. No technique was needed, no prior knowledge, no classes, no teachers — only the curiosity and the joy of discovering and playing.

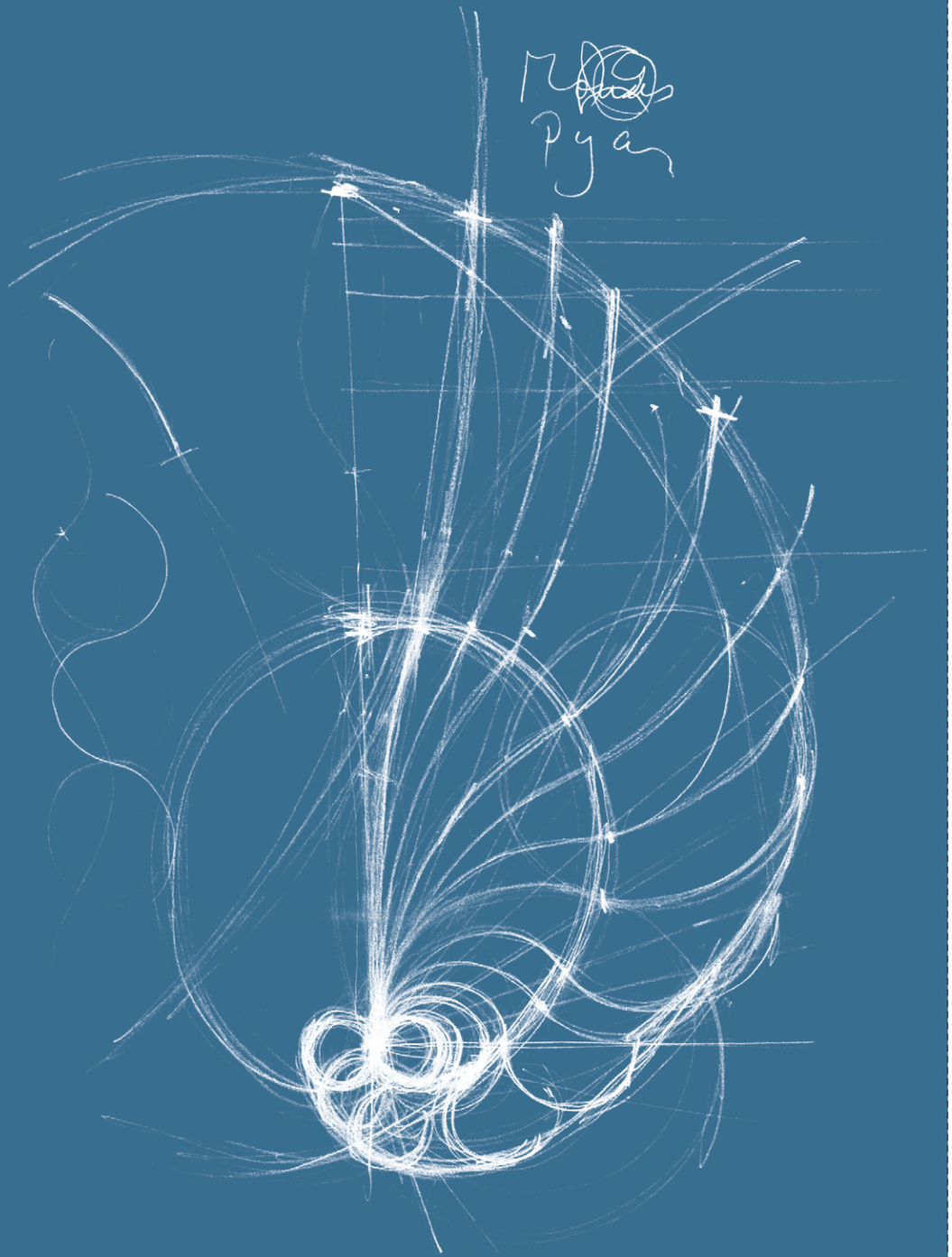
The direct interaction of the hands with the sensitive, sonorous vessel inspired musicians, percussionists, therapists, caretakers for the terminally ill, teenagers, travelers, street musicians, actors, the sick, the stressed, seekers, believers... Do all these people have something in common? Is it a longing, a hope for something new? They were all inspired to immerse themselves with the help of the hang, to encourage themselves and others, to soothe, to comfort or to treat. The response and the numerous letters bear witness to one thing: the hang works.

We too are reassured by our daily work with the hammer: the hang works. This is why we kept on making and tuning numerous hanghang. We developed our art further, listened even more closely and released ourselves from constraints in order to help this resonance body achieve its comprehensive fullness and balance. Each hang is unique and goes into the hands of an individual.

After PANArt stopped the retail trade of the hang and began to sell only locally, it was not long before the first imitations appeared on the market. We expected that others would take the hammer in their hands themselves, as we had done when we could not get any pans. Therefore, we encouraged them in the belief that each tuner would pursue his own sound and develop his own form and his own instrument. We never treated our knowledge as a secret. The findings concerning the raw form, the pang material and the corresponding technology that we had presented at the *International Conference on the Science and Technology of the Steelpan* (ICSTS) in Trinidad were published. The secret lies in the art of tuning, which is the result of many years of practice and experience. The shape of the hang is the expression of the internal tension specifically introduced during construction. The dome geometry, the size of the gu opening, the dimensions — all these are the results of our work.

But when people started to sell all kinds of sheet metal instruments and called them a "hang", we had to intervene and prevent the brand name "hang" from being used without permission. Imitators copied the hang's external aspect in detail, but they did not pay attention to the sound quality. We realized the purely commercial aspects behind this development. Today there are many instruments around the world that are inspired by the hang.

PANArt has applied for a trademark for its most recent creation, the gubal. This step should prevent the unscrupulous imitation of this form. We also hope that in protecting our creation, people will be encouraged and invited to be creative themselves and develop their own forms.



Freedom and the ring of steel

Among the people who came to Bern for the inauguration ceremony of PANArt was Leslie Pitchery from the Office for Standardization of Trinidad. In his presentation he talked about the efforts of the government regarding the standardization in the construction of steelpans. Until then, pan makers throughout the country built steelpans that carried their own signature in them. They were proud of being able to extract their own sound from the steel, giving their steel band an original sound. Each instrument reflected a particular area and its residents, and their performance at carnival radiated these individual characteristics.

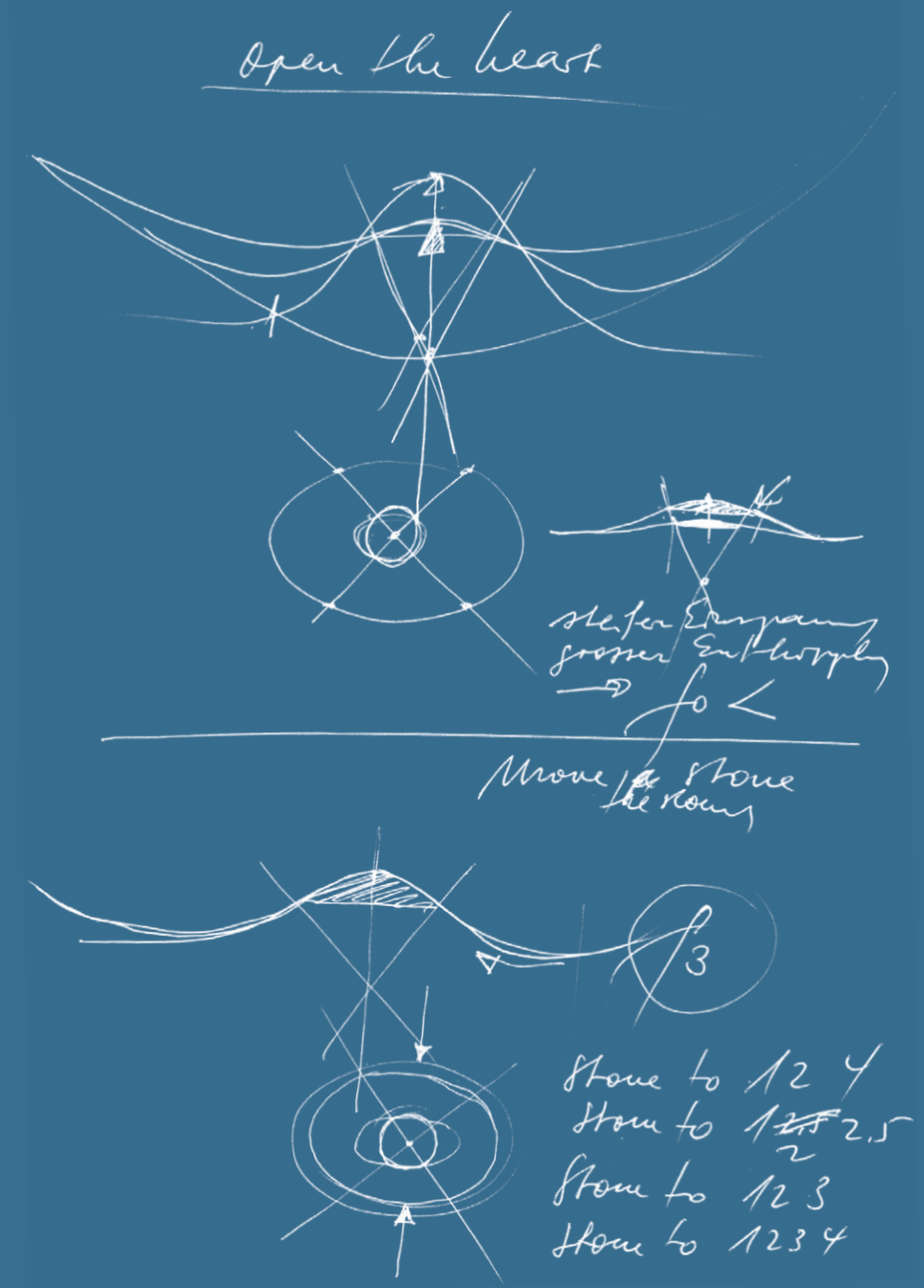
Great emphasis was placed on innovations in steelpan construction, and prizes were awarded every year. Some of these innovations were very promising with respect to standardization. Having discovered that the resonances in the tone field "octave, fifth, and double octave" could be manipulated, the sound richness of the instruments was augmented. At the same time, the Western music theory was adopted: the circle of fifths is a cosmic order. However, the circle was not applicable to the whole range of instruments. The deeper instruments featured two, three or four parts, and the arrangement of the tone fields in circles of fifths had to be split up.

As the steelpan found its way into schools, there was even more need for standardizing the instruments. Students should learn to play standardized tonal arrangements. The steelpan was declared as the national instrument and required a precise definition. Through elaborate research, the standardization authorities in Trinidad attempted to find a status quo for the steel bands that would serve as the basis for developing a set of standards.

During his first trip to Trinidad in 1991, Felix Rohner participated at a conference in Port-of-Spain on the standardization of steelpan instruments under the direction of Leslie Pitchery. On this occasion, it was obvious that the steelpan tuners would never renounce their freedom with sheet metal. They categorically refused any kind of standardization. They paid no attention to the guide *"Steelpan tuning"* by the Swedish physicist Ulf Kronman. Encouraged by the hope of being able to build an even better instrument tomorrow, the tuners were convinced that the sound of each new instrument would be a new development. It was clear that they would not let anybody dictate which tones should be hammered where and with what thickness and barrel diameter they should work. The tuners expected support from the government in the form of better access to raw material, but not by imposing rules.

More than twenty years have passed since then, and PANArt has come a long way. But we still regard the freedom in tuning with the same respect as tuners did back then. We can do justice to the complexity of our instruments only through a constantly open approach. There can be no standards for the tuning process; there are just too many parameters. Every tuner knows that his next instrument will be different from the previous ones, he knows that his profession will pose a daily challenge. The art of tuning must be seen and lived as a steady progression. Day after day questions arise concerning materials, tempering, balance and the degree of tension required to free the inner voice of the sheet and not stifle it. So let us forget standardization with respect to these special instruments. Their sound can of course be produced synthetically and made available as a sample or an app. But the result will have little in common with the formed impulse that human beings bring into the thin membrane with a hammer. Since the tuner does not only arrange vibrations but also gives form to the resonant body as a whole, he is constantly confronted with the question of what function the instrument will serve.

In this respect, there is no difference between our work and the steelpan tuner's work. The players, too, face the same task: to continuously re-adapt to the complex instrument, to continuously reflect themselves in it in a new aspect. The following is valid both for tuning and for playing: if the joy of dedicating oneself to the object is no longer present, the sound will be cheap and the inner silence disturbed by its unformed drone. The steelpan, the hang and the gubal are instruments that cannot be easily classified into traditional categories. They all live in their own time, they evolve continuously, stimulate people and awake their spirits.



Protecting creativity

Right from the beginnings of PANArt, it was clear that the company name should be protected in Switzerland as well as in its neighboring countries. Two years later we had to face the question of a copyright for a product again, and this time it was a process of which we were totally convinced. The positive experience with steel sheet nitriding made it possible to develop a raw form that allowed tuners to find their own sound using the best metal. A 1mm thick, deep-drawn nitrided sphere was fixed with a stainless steel skirt. With this raw form it was possible to manufacture soprano, alto, and baritone steelpans. In 1997 this development obtained a Swiss patent. We considered this raw form a kind of canvas on which any tuner could create his own sound, and thus offered it to almost 80 tuners we knew at a price of 250 CHF. The response was both disillusioning and revealing. Renowned tuners from different countries (Ellie Mannette from the United States, Jimmy Philips, Patrick Worrell, and the Panland Ltd. Team from Trinidad, Tommy Crichlow from Canada, Eckhard C. Schulz from Germany, and others) tested the raw form and rated it "very good", but the only person who actually made use of our offer was the Japanese steelpan maker Ryo Sonobe. Our well-meant contribution to the international community of tuners that had hitherto been limited by difficulties concerning the raw material, was not received well.

Convinced by the quality of our product, we built hundreds of ping and peng instruments, not only for Swiss steel bands but also for the nascent steel band scenes in Germany and France. With the patent protection, we wanted to prevent U.S. Americans, the Chinese or the Japanese from using our technology for the mass production of low-quality instruments. At the same time, the door to a further step in the development was opened in the form of a new geometric element. Structural problems evolved with the deeper tuned peng: the buckling caused navel-like tone fields to appear, which turned into veritable domes in the ping, peng, pong and tubal instruments. These instruments could no longer be played with mallets in the usual style. Therefore, we experimented with new playing techniques, we built a sound space with tuned steel drums in front of the hang house and played the black pans as though they were hanging bells. The hand began to play a role with the pung and the djempan (an instrument inspired by the djembe).

None of these creations aroused particular public interest. Each of them needed a special playing technique, they all seem to be capricious. At the end of the year 1999, the hang was born from assembling two hemispherical forms which were left over from tuning experiments. This provided a measure for the hands — and we began to anticipate in which direction we should go. But it did not occur to us to protect this creation. Nobody mentioned this issue, no one suspected that the hang would capture the spirit of the times in the way it did. While other steelpan tuners were copyrighting their tone arrangements and models with pattern and design protection, we were simply pursuing other questions. Was our hang an invention, a coincidence, a gift? Was it simply the result of a particular constellation of energies? Is it the individual who creates or is everybody involved — the audience, the neighbors, the spirit of the times?

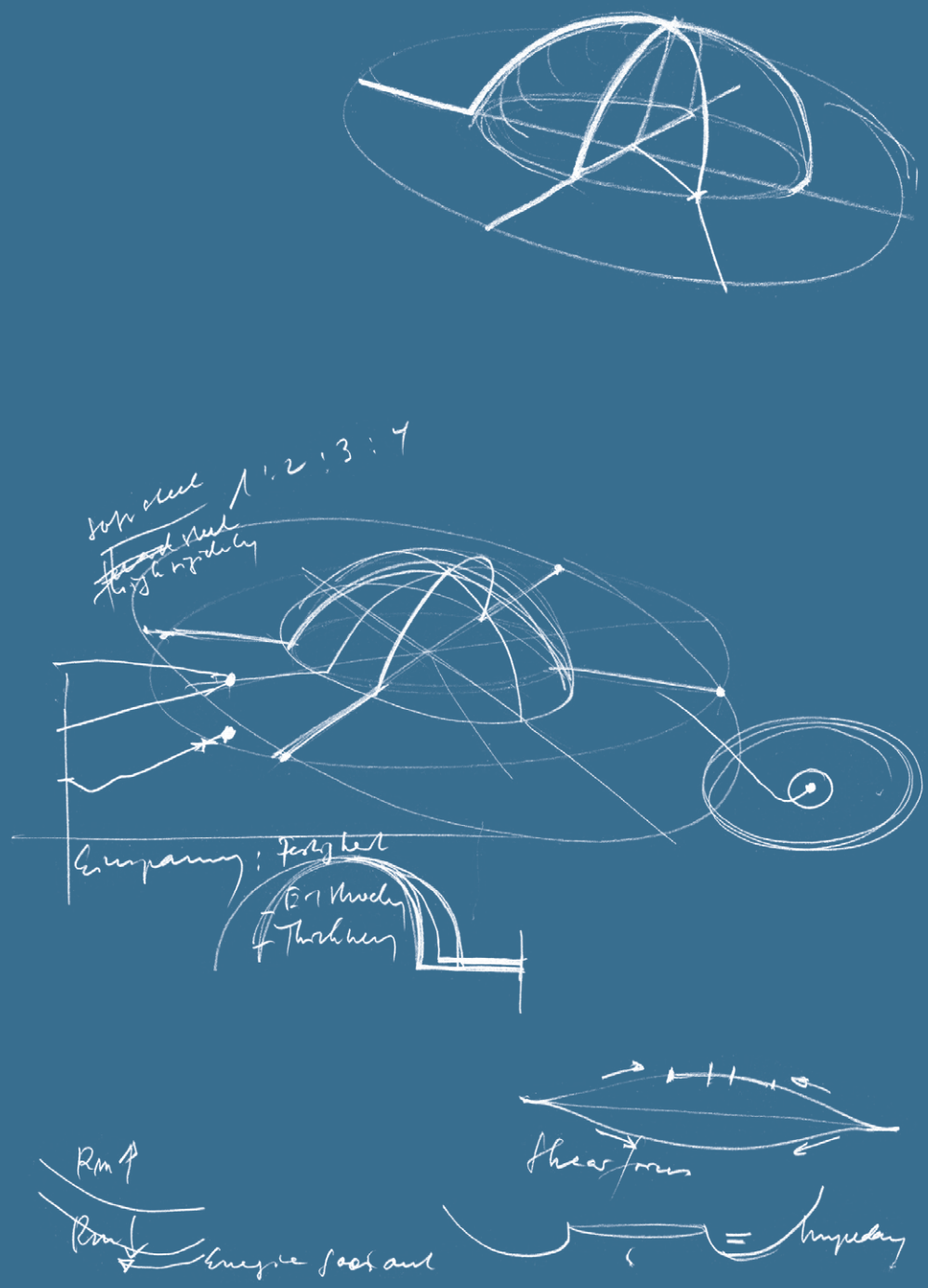
The subject of a copyright through a patent didn't turn up until we learned that more and more hang players claimed to have invented the hang, or told similar tales. This made us consider the question of the effect steel sounds have on people. When the first copies of the hang appeared in 2009, we turned to patent and market attorneys at Bovard AG. We learned that we were already quite late. However, an attempt was made to protect the hang's design. Unsuccessfully. There was nothing to be done against the copies by Bellart (Spain) nor those by Pantheon Steel (U.S.A.). All hope of getting a court to confirm that an undisputed original creation enjoys copyright protection and may not be just copied, evaporated. But we hang makers didn't let our heads hang. We realized that in those times the focus was on copies and not the original — yes, the trend even called for this development. However, we decided not to waste ourselves in quarrels with counterfeiters, and focused our energies on the creative development of the sound of steel.

Parallel to the development of the hang, we gained new insights in the field of nitriding technologies and in 2009 registered a patent that replaces the process of sandwich hardening with that of a new nitriding process. The patent "Method for the Production of a metallic-sounding Musical Instrument" is well underway today (2013) and is likely to be issued in the foreseeable future in the E.U. and the United States.

While looking for an attorney in 2007 for clarifying the above-mentioned agreements with our buyers, the topic of protecting the name “hang” came up. We were successful. In a first step we were able to protect the brand name “hang” in the E.U., the United States, and Japan. The Russian Federation, Belarus, Norway, and Colombia followed suit. However, the name “hang” was still in danger of being used as a generic or a technical description. Due to consequent rectifications, we finally managed to protect the brand name “hang” as an independent creation of PANArt Hang Manufacturing Ltd.

During the hang pause in 2012, new fruits ripened. Our flagship, the Free Integral Hang, had to be built with even more proximity to man. Having always played a major role in the steel band, the power of a bass was needed. The cavity resonances, discovered and described by the German universal scholar Hermann von Helmholtz in the 19th century, finally led us to the gubal. This time we faced the subject “copyright” in due time in view of the fact that a patent application must be made before the release of the product. Today, the design of seven gubal models is protected in Switzerland and Liechtenstein, in the whole E.U., the United States, and the Russian Federation.

Copyright protection demands a lot of effort and energy. We are fully aware of the fact that, in most cases, copyrights serve economic interests. However, in our company, in which creative processes play such a central role, copyrights protect us against exploitation. In this globalized world, we have no other choice but to consistently demand that at least a minimum set of rules be respected and followed. Speculation with our instruments annoys us, cheap imitations and shameless profiteering deprive us and our work of energy. In order to protect our creations, we will have to keep on spending energy — also in the future. We will try to spend as much as necessary, but as little as possible. And yet, we will continue to place creativity well ahead of profit. We hope to reach people who are willing to be accompanied on their individual path by one of PANArt’s instruments and to let it inspire them.



The lure of steel

It is obvious than when the first steel bands appeared in Trinidad, the European symphonic orchestra served as a model. The pioneers of the fifties managed to build from steel drums instruments that were tonally close to symphonic instruments: guitars, cellos, basses, soprano and alto pans. From this a sounding village emerged, in the center of which stood the "engine", the rhythm machine made of brake drums, scratchers, congas, and drums. All sorts of festivities were celebrated with groovy, hymnal music, and with it musicians participated in competitions during carnivals.

Although the black population's rhythmic richness was able to survive the age of slavery and across generations, their treasure of melodies and harmonies was virtually lost. Religious songs, children's songs, calypso songs, and radio offered themselves as a new melodic and harmonic source. The black communities also turned to sacred and classical music. They usually played the overtures of well-known operas, since these were particularly suitable because of their rhythmic potential.

Despite the exhilarating richness of such performances and the unquestionable success they had among the audience, critics never quite ceased to cast doubts concerning the suitability of such music for the steel band. Many complained about the sound quality of steel pans and demanded better training for pan players. At the core, however, what really irritated them was the particular Dionysian accent that the steel band placed on classical works. The advocates of the classical European music world offered little more than a tired smile to the new music.

In the eighties, pan players like Andy Narell and Rudy Smith came to Europe to give solo concerts. Many jazz fans were inspired by the exotic sound which was completely new in the music genre. But also in jazz, skepticism regarding the steelpan was clear from the beginning. Music critics were never really cordial and musicians complained about the steelpan confusing their perception and said they could just not hear the pitch.

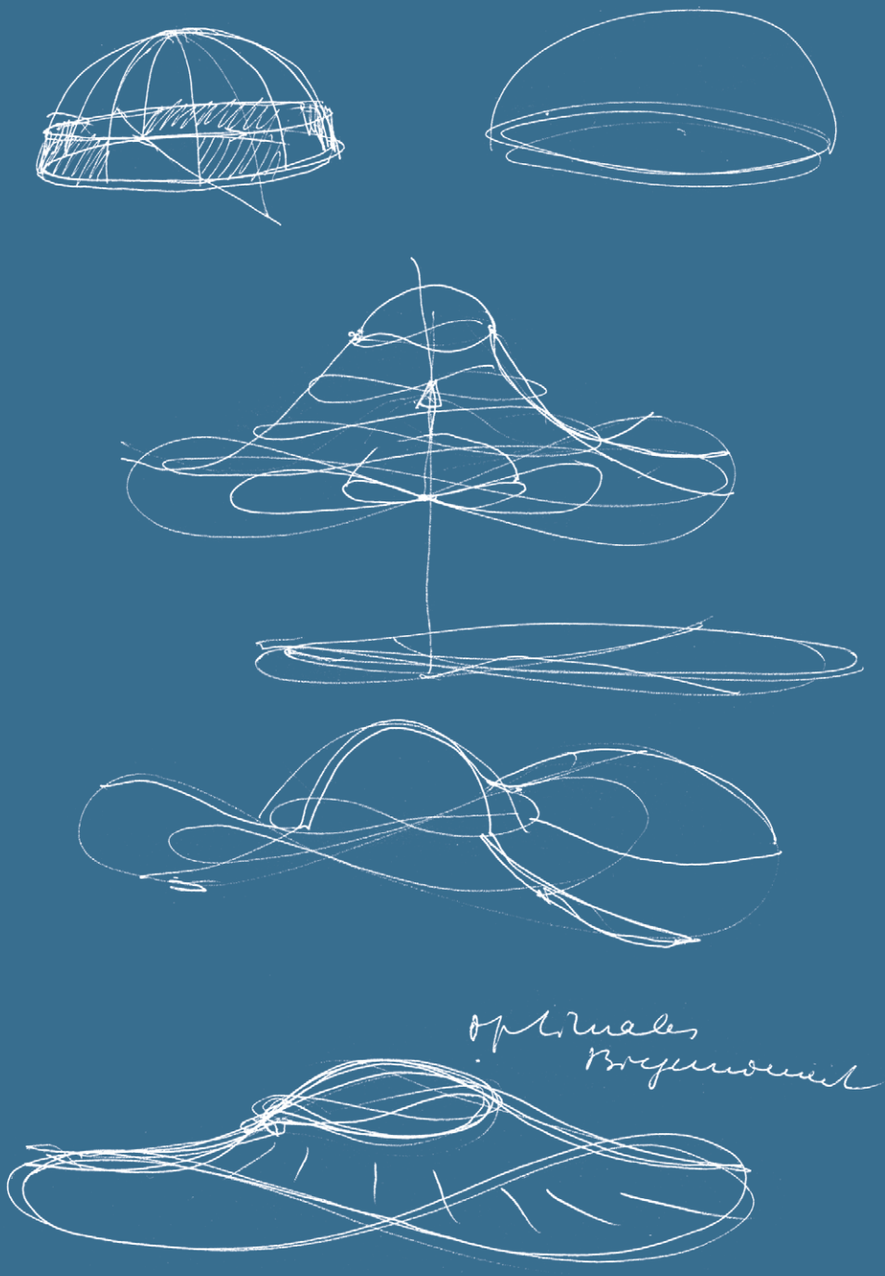
Thanks to scientific research, we can now classify these reservations and objections. Sheet metal instruments such as the pan and the hang react to the highest degree in a non-linear manner. Depending on the intensity of the stimulation, the impulse-like sound has a completely different character: dark and warm if played gently, clear and cold when hit sharply. There are no stationary frequencies; the total sound is a mixture of non-periodic vibrations, harmonic components, fluctuations and oscillations. Finally, the pan's sound fades away in high frequencies, whereas in the case of the string and the aerophone, this happens in the fundamental vibration. Altogether, the sound is rich in modulations, and all attempts at mastering the instrument, as is common in the Western musical context, fall short. People who have been educated mostly through classical music will usually struggle to accept the confusing, volatile incident, apparently raw and full of friction — it will not be easy for them to open themselves to this lively and charming sound.

Neither does recording technology seem to agree with the pan. Even during the boom it was quite rare to hear steel band music on the radio. Attempts to immortalize steel band music on tape or CD hardly ever led to any satisfying results. Players explained this by blaming the quality of recording techniques, sound engineers blamed the quality of the music. In the end, you just have to accept the fact that microphones cannot do justice to this complex and intense sound.

In its much shorter history, the destiny of the hang was similar to that of the pan. Received enthusiastically by musicians, it appeared very quickly on stages and in studios. The bonus of being exotic and the freshness of the unknown were savored thoroughly. And yet, a kind of discomfort remained: many listeners were interested more in the instrument than in the artist's music. Composers experimented on the hang, chamber ensembles and symphony orchestras considered the new timbre sympathetic. The sound of the hang found its way into nature films and, unsurprisingly, into commercials.

From the beginning, we hang makers had our reservations about hang music, subjected as it is to the constraints of performance. Time and again we saw the instrument's complexity as an invitation to a kind of intuitive playing capable of centering the player. We reduced the tonal system, dispensed with tuning to the standard pitch A, and arrived at the Free Integral Hang, whose gentle floating invites contemplation. What a contrast to the sounds of the pan, which soar into ever higher spheres until they almost evaporate.

Sheet metal allows no rest to those who work with it. It seems not to set any limits, whether towards the sky or the ground. It ought to be possible to bring the sound closer to the Earth and therefore even closer to people — we told ourselves. We searched and the door opened where we had least expected it. We wanted to return to the Earth and rose in the air, we sought in the sheet but found it in the cavity surrounded by the sheet. We recognized the potential of trapped air, to which we had hitherto paid little attention and which had silently made its contribution in the background. The gu opening shifted to the center, encircled by the ring of tone fields. Thanks to the gugel, the column of air which bulges downwards obtained its rightful space. From the gu comes the pulse carrying music that invites to a dance. Therefore, we call our instrument the gubal, which now takes its place next to the Free Integral Hang. The gubal speaks a strong vibrant language, it gets along well with other instruments, and — as the CD accompanying this booklet shows — today's recording technology stands up well to the gubal's sound (recorded in May, 2013 at the Hangbauhaus in Bern with a Rode NT4 microphone and a Roland CD-2 CF/CD recorder).



Let’s dance!

Starting with the pan via the hang, we have arrived at the gubal. Our profession has changed, our life has changed, the only constant companion has been the hammer. The hammer is slightly convex and is able to smoothen our pang material in the right way. It examines, classifies, and directs the forces generated by its patient dance. The order that the hammer helps to create is more than just a numbers game, it is unpredictable. The hammer configures sound impulses and connects energy reserves in a complex coherency. In the endless river of forms, it makes a landscape arise, an undulating landscape arched into a dome. It’s not a shield to keep somebody at bay, not a bowl for catching something — just a high-strung spherical membrane that resounds to the slightest touch.

Our journey with the hammer has been a long one — for 20 years with the PANArt vessel alone. On the way, as people that are driven and love their work, we carefully pursue the effects our work can have. Over the course of our journey, our realization of what Trinidad’s *“gift to the world”* is, became more and more clear. It is not a musical instrument which can be included in our music tradition. The gift is the very power of the steel. From this, people can gain orientation and strength for their personal development. We have realized that this gift can also be misunderstood, greed and egoistic ambition can arise. This text aims to make a contribution to counter those forces and to clarify misunderstandings.

For us from PANArt, Trinidad’s gift lies in the strong impulse for change. In Central Europe, this impulse does not lead in the direction of loud, grandiose performing. It leads towards silence and an inner revolution. Working with metal means working on the human. This is what sheet metal has shown us and in this spirit we allow the hammer to lead the way. Sheet metal can sound chaotic at first, sharp and banal. But if one succeeds in heightening its inner energy, if one succeeds in reshaping it into a resonating body, able to mirror the human being, then steel becomes strong and has the power to do good. Alongside the hang there is now another sound sculpture, the gubal. It is even more closely connected with the Earth and connects us more closely with it. Woven into the pulsations of the shaft of air, a kind of music can sound which both grounds us and invites us to dance.