Piano Manufacturing
An Art and a Craft

Nikolaus W. Schimmel
Since time immemorial, music has accompanied mankind. The earliest instrumentological finds date back 50,000 years. From this small beginning, a vast array of plucked and struck stringed instruments evolved, eventually resulting in the first stringed keyboard instruments.

With the invention of the hammer harpsichord (gravicembalo col piano e forte, "harpsichord with piano and forte", i.e. with the capability of dynamic modulation) in Italy by Bartolomeo Cristofori toward the beginning of the eighteenth century, the pianoforte was born, which over the following centuries evolved into the most versatile and widely disseminated musical instrument of all time. This was possible only in the context of the high level of development of artistry and craftsmanship worldwide, particularly in the German-speaking part of Europe.

Since 1885, the Schimmel family has belonged to a circle of German manufacturers preserving the traditional art and craft of piano building, advancing it to ever greater perfection. Today Schimmel ranks first among the resident German piano manufacturers still owned and operated by the original founding family, now in its fourth generation. Schimmel pianos enjoy an excellent reputation worldwide.

This booklet, now in its completely revised and updated eighth edition, was first published in 1985 on the occasion of the centennial of Wilhelm Schimmel, Pianofortefa brik GmbH. Its intent and purpose is to provide customers, guests and friends of our family business with an insight into the history of the piano and its predecessors and of our company, as well as familiarizing people with piano manufacturing as an art and a craft.
I would like to begin with a few remarks concerning joy – or to be more precise – the joy of playing music. This booklet is devoted to piano manufacturing.

Without claiming to be a complete treatise, it recounts the highlights of the story of how music came to be. In particular, it conveys something of the fascinating three-hundred-year history of the piano and its predecessors and how, since the early eighteenth century, innumerable talented and inventive piano builders, in both small and large steps, continually advanced the technical features, the sound, and the appearance of their instruments. Modern-day upright and grand pianos, instruments such as are being produced today by Schimmel and other piano manufacturing concerns of international renown, are the direct culmination of an extensive history of research and design.

The reader will also learn how a piano is manufactured in carefully planned work operations and how precisely its keyboard and action assembly must function in order for the instrument to fully meet all demands placed on it by the pianist, whether for classical music in the concert hall, in show orchestras or jazz bands, in the highly diversified world of pop music, for playing music at home for one’s own pleasure, or for social occasions.

All things considered, there are many different ways to make music, as many as there are musical instruments and temperaments, and there is no accounting for tastes. We should not deny ourselves the pleasure of playing a musical instrument and playing the piano, with its harmonious sonority, it is perhaps the most delightful, or at least one of the most comprehensive ways of entering the world of music. Moreover, one can entrust oneself to the piano, with all one’s feelings, thoughts, and moods, as did the great composers of the Classical and Romantic periods, including many women, such as Fanny Mendelssohn and Clara Schumann-Wieck. They all left us works in which they have, beyond all formal principles, entered into a perpetual dialogue of feelings with us.

Like composers who have ascribed their innermost thoughts and feelings to the piano, the instrument remains – for everyone who knows how to play it – an effective and distinct medium for communication. Perfection in playing is not necessarily paramount, nor is the origin or style of the music all that important. The piano proves itself to be a true all-purpose instrument capable of communicating emotions and turning sadness to joy.

Joy is the true mainspring of playing music. Those who cannot experience the joy of playing music are better off not touching a piano – or, for that matter, any other musical instrument. Joy transcends rhetorical description and can be expressed in so many ways. It is a wonderful feeling that keeps us going, that makes us happy. Much smarter people than I have pondered the concept of joy and why one experiences joy so intensely when playing music.
The concert program was unique, and included works by Rachmaninov. The concert was attended by over 4,000 persons. Hall, and for which Schimmel supplied 100 new Millenium pianos.

The photos show scenes from the concluding concert of the Gina Bachauer Young Artists International Piano Competition. The concert program was unique, and included works by Bach, Mozart, Roussel, Ravel, Offenbach, and Rachmaninoff. Schimmel promotes the younger generation of pianists in many different ways, including granting scholarships, sponsoring competitions and benefit concerts, donating prizes etc. The photos show scenes from the concluding concert of the Gina Bachauer Young Artists International Piano Competition (1997, Salt Lake City, Utah, U.S.A.).

Every attempt at definition gets bogged down in approximations, because each individual experiences joy differently. But perhaps we could put it this way: Joy is the opposite of fear, of action or events, or whatever term might be in current use. Joy comes from deep inside. One could almost say – at least with reference to playing music – we create it ourselves, because there is scarcely any other art form that appeals to us as directly as does music. Whereas, fun comes from an outside source. It is brought to us.

To be sure, the above analogy does not tell the whole story. It can only be a part of the truth: Music, too, is brought to us. Not everyone can play music, but anyone can develop an appreciation for it, become spellbound by it, and experience an ineffable joy listening to it. With regard to enjoying listening to music, I would like to relate a brief personal experience which I shall always remember.

It must have been 1956 or 1957. I was waiting for my teacher in a room of the conservatory where I was studying. It was quiet in the high-ceilinged room of the former lordly villa. Suddenly I heard someone playing the piano in the room next to mine. A passage from the first movement of Mozart’s Piano Concerto in D Minor. Then another passage. Later, an excerpt from the middle movement, the romance. Someone was practicing. But who? I had never heard anyone play so perfectly. Certainly not among my fellow pupils or even among the teachers. I was unable to get up the courage to open the door of the adjoining room, so I stood there and listened to the music, damped somewhat by the wall. Not until that evening, in the concert hall, did I learn from one of the other pupils who had been practicing. It was Clara Haskil, perhaps the greatest twentieth century interpreter of Mozart.

Before Clara Haskil died in an accident in 1965, I had the opportunity to hear her play Mozart in a concert. This Russian pianist, at that time not yet so old, but frail looking because of past illness and tragedy, hunched over the keys. It was one of those rare concert hall occasions when one finds oneself sitting on the edge of one’s chair breathless. Suddenly everything becomes a single unit – music and audience – completely spellbound by the playing of this woman. And there it was – this joy of just being able to listen. Perfect playing technique. Perfect interpretation of this woman. And there it was – this joy of just being able to listen.

Gina Bachauer Young Artists International Piano Competition (1997, Salt Lake City, Utah, U.S.A.).
It is a fact of life that piano sound, in association with great virtuosos since the early nineteenth century, continues to radiate its unbroken fascination. One needs only read Heinrich Heine's reports on the cultural life of Paris in the 1840's in the Augsburger Allgemeine Zeitung, how he deals with the piano virtuosos of his time with wonderment and irony. For example, Franz Liszt, “…the genius, who is again giving concerts here, which exert a magic that borders on the fantastic. All pianists pale in comparison with him – with one exception, Chopin, the Raffael of the fortepiano”, to whom he refers elsewhere as the “charming tone poet”. Heine even refers to Liszt’s competitor Sigismund Thalberg as a “musical gentleman”.

“Heinrich Heine, on the other hand…”, writes Heine, “…one no longer thinks of difficulties to be overcome; the piano disappears, revealing music”, followed by a jab at Alexander Dreyschock (today we would say, probably unjustified). Although he reaped great applause in Paris of that time, to the ears of Heine, his playing was only a “hellish spectacle”. Heine: “One is under the impression of hearing, not one pianist, Dreyschock, but three (drei) shock pianists. Since, on the evening of his concert, the wind was blowing in a southwesterly direction, it is entirely possible that his playing could be heard in Augsburg; at such a distance the effect would certainly have been an agreeable one”. To which he adds: “Go hang yourself, Franz Liszt, you are only a wind idol in comparison with this thunder god”. But this is merely a brief side excursion and an early example of how piano playing and its interpreters have always stood at the center of feuilletonistic contemplations, comparable only with virtuoso violin playing of the Paganini era.

It was the piano, and no other instrument, which for almost a century dominated not only the concert halls, but the parlors and living rooms of the bourgeoisie, as well. In a time without radio and other media, the piano provided musical entertainment and education, from the sentimental “Prayer of a Virgin” to waltzes, to classical and romantic sonnets… even entire symphonies arranged for four-handed playing. Those were the days! Nowadays, those who – particularly in their youth – devote themselves to playing the piano, often no longer do so because of piano lessons being imposed on them by their parents. The young Goethe, disappointed with his piano teacher, as recounted in his work Die Leiden und Wunder der Musik – regretted his lack of determination in later years.

As a rule, today’s young people who learn to play a musical instrument do not do so because it is expected of them by oversambitious parents who desire to experience vicariously through their children what they themselves never had the opportunity to do. They are more independent. If children feel drawn to music, it is often because of an indeterminate longing, supported by parents, or because of friends or classmates who play a musical instrument, serving as role models. If talent is evident, particularly in cases where a competent teacher is able to coach and inspire, the real beauty of performing is revealed, namely, the fascination and joy of playing the piano and entering the wonderful world of music which no one has ever regretted.

Rolf Heckelsbruch, Music Critic Brunswick (Braunschweig), Germany

Music knows no borders. It is bound neither to style and prevailing tastes nor to ethnic or national preferences. Musicians differentiate only between good and bad. Music must rouse sentiments, must have an aura, must possess spirit, wit, charm and, above all, stature. Among the convincing examples of how music alternates between the worlds of sound of yesterday and today are the “Jazz Meets Classic” concerts of the pianists Ratko Delorko and Christoph Spendel.

This musical diversity is reflected in the photo to the left, in which the “classic” insides of a Schimmel grand contrast with a fanciful modern-art cabinet created by the renowned painter and sculptor Omar Ali. Schimmel has exceeded the bounds of traditional piano manufacturing with completely new design features.
The Origin of Music and Stringed Instruments

It was the cattle thief Hermes

According to the earliest myths of the various peoples of the world, music was a gift from the gods. Various legends describe how mankind received and perceived this gift. One such legend is recounted by Homer, the blind poet of Greek antiquity (end of the eighth century B.C.), in his hymn to Hermes. Born in the morning as the son of Zeus and the beautiful nymph Maia, at noon he sees a turtle and forthwith constructs the first cithara from its shell. Homer reports: “Thus Hermes cut hollow reeds to measure and fastened them firmly to the skin along the backbone of the turtle. With clever comprehension he stretched cowhide over the whole thing, attached curved arms to it, connected them by means of a yoke and strung it with seven ‘symphonically’ tuned strings of sheep’s gut. Finished was the delightful ornament. He took it and tried out each string one after the other and under his hands it resounded mightily…”

Idiophones and noisemakers

To round off the day, that evening Hermes, in short order, stole the cattle of the sun god Apollo, which not surprisingly did not jeopardize his career as the fleet-footed messenger of the gods. On the contrary – from that time on he was also the patron god of herds, merchants, and thieves. Apollo, charmed by his brother’s cithara playing, forgave him.

A nice story. Yet as to how music really came into being – since Charles Darwin’s Theory of the Origin of Species (1856) there have been many different theories. Experts are all in agreement that music had its origin in magic and religion and originally consisted of rhythmic noises. Yet this origin, which took place in the Stone Age, has been lost in the dawn of prehistory. Archaeological finds indicate that Neanderthal man already possessed simple idiophones (i.e. “self-sounding” musical instruments) over 35,000 years ago: noisemakers of stone or wood and pendent rattles which did not produce musical tones but only noises. These noise-making devices helped early man ward off the demons of darkness and the evil forces of nature.

The extent to which music was originally a component of magic rites, of casting spells on animals, invoking gods before going on a hunt, and of healing and death ceremonies, can be seen in the fascinating paintings of the cave dwellers of the late Stone and early Ice Ages. They show figures wearing animal masks playing flutes fashioned from reindeer bones, as well as the stick zither with its one strip forming a “string” – are among the earliest predecessors of stringed instruments.

The Evolution of the Piano

Drawn through the ages, the depicting of people playing music has pervaded the art of almost all people. We find it in cave paintings, in ancient Egyptian temples, in the frescoes of Pompeian villas, in medieval book miniatures, as well as in this gallant rococo scene, showing a couple playing a duet on an early square piano and a violoncello and their audience, painted in England in 1773 by Johann Joseph Edler.
The stars sing – on music and mathematics

The cradle of the advanced civilizations emerging from the darkness of prehistoric times into the light of history was in fertile Mesopotamia. Wind, percussion, and stringed instruments were played in the temples and at festivals in honor of rulers. The Babylonians, Assyrians, and Egyptians likewise had hosts of musicians parading in honor of their gods, kings, and Pharaohs. The Bible (1 Chronicles 23:5) mentions four thousand Levite musicians in the service of the Tabernacle in ancient Israel during the reign of King David (1027–1037 B.C.), who himself played the harp and composed many of the Psalms, which were originally sung. Thus, the earliest known music was of a divine and cosmic nature. It was in ancient Greece that it rose above legends and myths and a theory of music based on mathematics saw the light of day. Using the monochord, Pythagoras of Samos (c. 570–492 B.C.), supposedly claimed that everything is numerical in its basic essence. He determined whole-number ratios of just musical intervals, upon which he developed an esoteric doctrine of an all-encompassing harmony of worlds, referred to as the “music of the spheres”. Pythagoras and his disciples kept such theories secret, passed on only by word of mouth, out of fear of a conservative backlash on the part of the religious establishment, in whose view these newfangled astronomers, with their heresy that the heavenly bodies were not gods and goddesses but inanimate objects, represented a threat to religious authority. After all, they deal with the two kindred original forms of being, namely, number and quantity.”

Music which cannot be heard – music in classical antiquity

Musica mundana, musica humana and musica instrumentalis – these form the tristellar constellation of the conception of music in the period of classical antiquity. The first two cannot be heard. Musica mundana was the “exalted music of the spheres”, the numerical harmony of the macrocosm as reflected in the movement of heavenly bodies, the regular succession of the seasons, and the order of the four elements: fire, water, air, and earth. As late as the time of the astronomer Johannes Kepler (1571–1630), the laws set up by Pythagoras concerning the harmony of the music of the spheres were still considered valid. Musica humana, on the other hand, expressed the harmony of the human microcosm with its interaction between the body and soul, temperaments and mental powers. The only type of music perceivable by the human ear was the musica instrumentalis, heard in the great Greek tragedies and at the Olympic singing competitions.

This tripartite view of music was so prominent that for centuries it remained a required part of the liberal arts curriculum at the universities of medieval Europe, using as textbooks the writings of Augustine, Boethius, and Isidor of Seville. Mastering the seven liberal arts was a prerequisite for studying the higher faculties: theology, medicine, and law.
Early Stringed Instruments — Plucked Wood

The stick zither
The first known forerunner of the zither had only one "string." The stick zither, seen in ancient cave paintings, was still in use among primitive tribes until only a few decades ago. It was made of bamboo cane. Two parallel cuts in the surface resulted in a narrow strip of bamboo with both ends still attached. A small wooden peg was then inserted under each end of the strip, raising the latter and at the same time placing it under tension. A musical tone was produced by plucking a strip. The stick zither seems to have been invented more than once, at different places and at different times, independent of each other.

The tube, box and raft zithers
The stick zither was followed by the tube zither. A clever prehistoric musician probably hit on the idea of making a piece of bamboo cane with multiple strips of different lengths so that he could invoke the gods with various different pitches — a giant leap forward in the evolution of the zither.

The third type of primitive zither was the raft zither. Hats off to this remarkably versatile instrument and its anonymous inventor, who was not satisfied with just one stick zither, but lashed several together, tuned to different pitches, in the form of a raft. An early masterpiece of musical-instrument making. The evolution of the stick zither to the raft zither seems to have taken place over a period of a few thousand years, about to the end of the late Stone Age. But what did time mean in those days?

The zither — the vogue instrument
The zither remained popular throughout the ancient advanced civilizations of Mesopotamia, Egypt, Syria, and Egypt at least until the dawn of the Bronze and Iron Ages, having by this time evolved to its boxed and box forms. Harmoniously tuned strings of gut or sinews, which had in the meantime replaced wooden strips, along with a decorated soundboard or sound box, resulted in a vastly improved sound. Independent of Western developments and influences, musical culture evolved to a high standard in India, Japan and ancient China. In the Middle Empire, the birthplace of the curved board zither, among other musical instruments, music was "the standard for heaven and earth, the principle of equilibrium and harmony". The gods had not limited their gift to any particular part of the world, race, or religion, but only to the creativity and imagination of mankind.

The aristocratic psaltery
During the course of history, two lines of developments led to the instruments of the harpsichord family and eventually to the pianoforte. The first line included the zither, along with the psaltery and the dulcimer, which evolved from the zither family. The book miniatures of the Middle Ages contain illustrations of tapestries and paintings of angels playing the psaltery, whether to the glory of God and man, for their own pleasure, or for a party. The frame zither was brought to Western Europe from Arabia around the eighth century and remained in vogue until the seventeenth century. Plucked with the fingers or with a plectrum, its strings of gut or metal produced a distinctive sound and instrument makers of the Renaissance and Baroque periods were busy making exquisite and highly ornamental psalteries.

The rustic dulcimer
The psaltery was played almost exclusively by the ecclesiastical, aristocratic, or upper-middle-class, whereas its cousin, the dulcimer, became more and more the preferred instrument of the simple country folk. Despite the fact that Michael Praetorius (1571–1621) composed some charming courtly dance movements for it, as early as the sixteenth century the dulcimer was classified as an instrumentum ignobile. Yet the dulcimer, down to this day a prominent feature of Alpine folk music, is important insofar as its strings are not plucked, but struck with two small hand-held beaters. The dulcimer did not lead directly to the pianoforte; there was an intermediate stage — the instruments of the harpsichord family: the spinet, the virginal and the harpsichord.

The monochord — music and arithmetic meet
The second line of development, likewise starting with the stick zither, led from the above-mentioned monochord via the polychord and clavichord to the pianoforte. However, the two lines had to converge around the end of the seventeenth century in the form of the ingenious harpsichord builder Bartolomeo Cristofori (1655–1731), the father of modern piano manufacturing.

The monochord was used by Pythagoras in contriving his laws concerning the music of the spheres, and as an indispensable teaching aid of the medieval music masters. It consisted of a resonator and a single string under tension with a stationary bridge at each end and a movable one in between. The movable bridge enabled the string to be divided into various different speaking lengths, representing the just interval ratios. The ratio 2:1 produced the octave, the ratio 3:2 produced the fifth, the ratio 4:3 produced the fourth and so on until we finally arrive at 9:8, the ratio for the major second, or whole tone. Conversely, numbers could be expressed as tones. Music and arithmetic met. The problem with the monochord was that it was poorly suited for making music.

The polychord
The polychord, similar in construction to the monochord, but with multiple strings of different pitches, was much better suited for music making. Not only could it be used to demonstrate interval ratios, but in the Middle Ages it was, in addition, used for teaching harmony and became a popular musical instrument, for which polyphonic compositions were written.
The clavichord — pointing the way to the pianoforte
It is not clear exactly when or by whom the first clavichord was built, paving the way for mechanical sounding of strings. The first historical reference to the clavichord occurs in the Canon of Minden and Monzeiger Eberhard von Cersne in his rhymed allegory Der Minnet Regel, written sometime after 1404. None of these early instruments have survived. The earliest clavichord still in existence today is one by Domenico da Pasaro from the year 1543.

What, then, makes the clavichord so significant in the long evolution of the pianoforte? Is it the link between the instruments in which strings are mechanically energized by direct plucking or striking. The playing mechanism of the clavichord was actually quite simple. Yet this flat keyboard instrument could be conveniently laid on a table for playing, and was already pointing the way to the development of the strung keyboard instruments. The clavichord key, when depressed, raises the tangent (a small upward-pointing metal wedge attached to the opposite end of the key), pressing the tangent against the string. Unlike the movable bridge of the monochord, the tangent performs the dual function of setting the string into vibration and serving as one of the string terminations. The non-speaking segment of the string is damped off with felt. The tangent remains in contact with the string for the entire duration of the sound, which means that the player can produce a vibrato by varying the finger pressure, while holding the key down. Since the clavichord was so subtle and expressive, it remained popular for several centuries.

Fretted and unfretted
The clavichord existed in two versions: fretted and unfretted. The earliest clavichords were fretted, a term borrowed from lutemaking, meaning that one and the same string was assigned to more than one key. The advantages of this design – simplicity and low cost – were offset by the disadvantage that it was not possible to play all combinations of notes, precluding certain chords and chord progressions.

This problem was later solved by the unfretted clavichord, in which each key had its own string(s), so that complicated chromatic chord progressions were possible. Some unfretted clavichords had two- and three-string unisons, i.e. two or three strings per note. As a rule, such instruments produced a sound which was richer in overtones and more expressive, although not much louder, than the fretted ones with one string per note.

The Harpsichord Family of Instruments
The death of many ravens — the mechanization of plucking
Music which was written for the three noble instruments of the harpsichord family, the harpsichord, the spinet and the virginal, was virtually infinite in its diversity and beauty. It spanned the “Golden Epoch”, such as that of Elizabethan England, Spain, the Netherlands, France, and Germany up to the height of the Baroque period. Composers who wrote for the clavichord include, but are not limited to, William Byrd, John Bull, Orlando Gibbons, Gheolamo Frescobaldi, Antonio de Cabezón, Jean Philippe Rameau, Francois and Louis Couperin, Jan Pieterszon Sweelinck, Arnold Schlick, and of course the grand masters, Bach and Handel.

The monochord was the forerunner of the clavichord, as the ingenious quilled-action piaultry, plucked with a plectrum, was to the noble harpsichord, spinet and virginal. Many a raven had to lose its feathers to the harpsichord builders of the era. A leather or raven quill plectrum was attached to a wooden “jack” which was attached at the back end of each key. The jack was designed so that the quill would pluck the string only on the upstroke, when the key was depressed, not on the downstroke (release). In rest position, a felt damper mounted to the jack would damp the string. In other words, the piaultry had been mechanized.

A silver sound — the harpsichord
Surprisingly, the clavichord remained popular and continued to be built long after the advent of the instruments of the harpsichord family. The silvery sound of a harpsichord (Italian: cembalo; French: clavecin; German: Cembalo) in comparison to the gentler sound of a clavichord, is appreciably louder. Yet the clavichord possessed an advantage over the harpsichord: the capability of dynamic modulation, resulting in a sound with more life to it. Unlike the clavi-
The musical performances show it being played by young women and girls. Contemporary paintings depicting its sound was as delicate as its construction and is hardly likely to have disturbed the neighbors. Its strings were arranged diagonally because of space restrictions. There were sometimes as many as five strings per note, which he played with two-faced leather hammers rather than beaters, the one face hard and the other soft, for forte and piano. Like the later pianoforte, the Pantaleon had dampers and a sustaining pedal. Hebenstreit attained such great proficiency on the instrument—the name “Pantaleon”, being suggested by King Louis XIV—that he was able to earn a better living with it than he had playing the violin. Following his death in 1792, the Pantaleon vanished from the concert scene. It experienced a brief comeback during the early Classical period, but it stood no chance against the competition from the pianoforte. Only the cimbalom, similar to the Pantaleon in construction and sound, survived in Gypsy orchestras and inter alia in compositions by Zoltán Kodály and Igor Stravinsky.

The piano family of instruments

A super dulcimer—the Pantaleon

The two lines of development—one via the zithers and one via the mono- and clavicord—finally converged and resulted in the development of the pianoforte. However, there was another predecessor: an exotic instrument called the Pantaleon, a “super dulcimer”, which was invented by the German violinist Pantalone Hebenstreit. Accompanying him on concert tours starting in 1690, Hebenstreit provided his instrument with 5 octaves, two soundboards and 186 strings of gut and metal for a mellow or bright sound. There were many as well as five strings per note, which he played with two-faced leather hammers rather than beaters, the one face hard and the other soft, for forte and piano. Like the later pianoforte, the Pantaleon had dampers and a sustaining pedal. Hebenstreit attained such great proficiency on the instrument—the name “Pantaleon”, being suggested by King Louis XIV—that he was able to earn a better living with it than he had playing the violin. Following his death in 1792, the Pantaleon vanished from the concert scene. It experienced a brief comeback during the early Classical period, but it stood no chance against the competition from the pianoforte. Only the cimbalom, similar to the Pantaleon in construction and sound, survived in Gypsy orchestras and inter alia in compositions by Zoltán Kodály and Igor Stravinsky.

The first pianoforte

Success has many fathers, as the old saying goes. And, of course, many good and clever musical-instrument makers made their contributions to the invention of the pianoforte. For example, Arnauld von Zwolle († 1466), who experienced a hammer action as early as the late Middle Ages. They all pondered on how to impart to the clear, meded with a hammer action as early as the late Middle Ages. They all pondered on how to impart to the clear, sustained sound (the pianoforte) the capability of dynamic modulation. But in the end, the efforts of only one individual were crowned with success: Bartolomeo Cristofori—our man at the converging point of the two lines of development.

Cristofori, born in 1655 in Padua, came to Florence as a musical-instrument maker in 1690. On a nasty, cold day in March of the year 1698, he had a chance encounter with the organist and composer Francesco Maria Manzucci, who at the time was working in Bologna and Florence, in front of the San Lorenzo Church. Bursting with pride, Cristofori showed him a model of a new type of action for a harpsichord that struck the strings rather than plucking them. In this week before Palm Sunday, probably no one was aware that the world stood at the dawn of a new era in the history of music. Although Cristofori was harpsichord builder to the Florentine Court and curator of the De Medici musical instrument collection, it took two more years before he was able to present his ingeniously designed hammer-action instrument to his patron, Prince Ferdinand de Medici. The first known documentation of this is an entry dated 1702 in the inventory book of the De Medici musical instrument collection in Florence. But it was not until 1725 that the Hamburg music critic and composer Johann Mattheson, who otherwise was all ears for every new sound, published a report on Cristofori’s invention in his magazine Critica musica, after having read the translation by Ulrich Koezig (Dresden, Germany) of an article published in 1711 and 1719 by the Italian marchese Scipione Maffei in his Giornale dei litterati d’Italia.

Following a florid introduction, Maffei first laments that the harpsichord had hitherto been “entirely deprived” of the possibility of increasing and decreasing the volume of sound, as can be done with bowed stringed instruments, “and it would be viewed as conceit if anyone...
were to come up with the idea that he could manufacture such an instrument that would have this special gift." Yet “in Florence so bold an invention has been no less happily conceived than famously executed by Signore Bartolommeo Cristofori, a clavier maker in the service of the Grand Duke.”

Gravicembalo col piano e forte

Although Cristofori had been promoted to curator of Prince Ferdinando’s musical instrument collection, he was not altogether happy with his invention. “Copycin” builders were commonplace at the time (patent laws did not exist) and this was a source of considerable consternation for Cristofori. Cristofori built about twenty of these hammer harpsichords, which he called gravicembali col piano e forte (“harpsichords with piano and forte”), after which he returned to the more lucrative venture of building standard harpsichords with a quill action. The terms piano and forte are derived from Cristofori’s early eighteenth century creation: The first known occurrence in writing Piano without ‘forte’ was in 1819.

It is not known whether Francisco Durante and Domenico Scarlatti, celebrated harpsichord virtuosos and composers of that day, ever played on Cristofori’s piano-forte, but it is entirely possible. However, it is known that in 1732 the highly esteemed dilettante Ludovico Giustini, writing in his piano sonatas, the first composer to do so. This was one year after Cristofori’s death. Nothing is known of any other such examples of keyboard pioneer spirit in Italy, so Cristofori gets the credit for producing the first practical hammer harpsichord, or piano-forte, the forerunner of the modern piano. In France, Jean Marius had developed a hammer action as early as 1716, but it never got off the ground. Likewise, the hammer actions developed in 1717, the German master Christoph Gottlieb Schröter in Dresden – in two versions, with up-and-down striking hammers – were a flop. The harpsichord remained popular throughout the Baroque era.

Silbermann’s triumph

It was presumably through Mattheson’s article in Critica musica that Cristofori’s invention came to the attention of the renowned Freiberg organ and harpsichord builder Gottfried Silbermann (1683–1753). Convinced of its future, he learned everything he could about the new hammer action and, more importantly, he possessed the craftsmanship and the artistry to improve on Cristofori’s design. Although Silbermann’s instruments would sound somewhat metallic to today’s listeners, the fate of the harpsichord was sealed and there was no stopping the evolving triumph of the piano-forte from that day forward. Silbermann was a powerful inspiration to generations of pianoforte manufacturers in Germany, and, in fact, in all of Europe.

Even though the harpsichord was dominating musical life, Silbermann’s grand piano-forte was quickly gaining in popularity. King Frederick II (Frederick the Great). of Prussia ordered two at once. This was a bit odd, since Frederick, who played the flute and was an elegant composer, was more a traditionalist when it came to music. Undoubtedly the piano-forte was received with considerable enthusiasm by the king and the highly gifted musicians of his court orchestra: Carl Philipp Emanuel Bach, Franz and Georg Benda, the two Graun, and others.

Johann Sebastian Bach did not at first, share this enthusiasm over Silbermann’s instruments. During his visit in Potsdam in 1747, Frederick played the famous B-A-C-H theme “thema regium” on a Silbermann grand piano-forte, on which the Cantor of St. Thomas then improvised, later dedicating it to the King as a “musical sacrifice.” To Silbermann’s vexation, Bach, mockingly referred to by his sons as “the old fogy”, remained true to himself and the harpsichord. It was not until almost the end of his life that he eventually showed a certain appreciation for the pianoforte, which had been undergoing continual improvements.

Stein, Mozart and Streicher

Among those contributing to the improved features of the pianoforte was the Augsburg organ and pianoforte builder Johann Andreas Stein (1728–1792). The young Wolfgang Amadeus Mozart was in love with the sound and technical features of Stein’s grand pianoforte (as well as with Stein’s cousin of dubious repute). There was scarcely any other musical instrument to which Mozart entrusted so much of his innermost feelings than the pianoforte, particularly in his sonatas and concertos.

Stein produced over 700 pianofortes in his factory in Augsburg. However, like Mozart, he and much of his family were drawn to Vienna, at that time the capital of the Habsburg Empire and the music capital of Europe. Instruments from the factories of Stein and Streicher, with their highly developed dynamic-modulation capability, quickly established the excellent reputation of the “Viennese action.”

The “singing” tone

What, to Cristofori’s dismay, got off to a slow start, was now in demand in all of Europe – the pianoforte with its hammer action. Clever musical instrument builders everywhere devoted themselves to perfecting it. Sebastian Erhard (1752–1831), upon emigrating from Strasbourg to Paris in search of employment, Gallicized his name to Sébastien Erard and in 1777 built the first pianoforte on French soil.

Because of his close connections with the French aristocracy he had to flee to London in 1792 to escape the guillotine of the French Revolution. His brother, Jean-Baptiste, who had no such connections, was able to continue running the factory in Paris. While in London, Sébastien Erard not only manufactured the first double-pedal harp, but in 1821 invented the repetition lever, which continues to be used in every modern grand piano action.
Nevertheless, the pyramid was an original invention in the sense that, unlike the clavicytherium, it had a hammer, rather than a quill action and rested on the floor instead of on a table. This was an impressive instrument. There were others: the giraffe (Giraffenflügel), lyra pianoforte (Lyraflügel), and the cabinet pianoforte (Schrankflügel), equipped with doors. In their outward appearance, they remained fanciful arabesques of pianoforte manufacturing, but their action mechanisms helped pave the way for the development of the upright piano.

The first upright pianofortes emerged successfully on the market after 1800; they formed the vanguard of their modern counterpart. However, the innovation was to come from England, where William Southwell introduced his cabinet pianoforte in 1807 and Robert Wornum introduced his likewise space-saving cottage pianoforte already in 1811. Small upright pianofortes were also manufactured in other countries. Jean-Henri Pape of Paris (France), who in 1828 created the “console piano”, only 1 meter in height, and Wilhelm Schimmel of Leipzig (Germany), were two of several talented inventors who made important contributions to modern-day upright piano manufacturing in the nineteenth century.

Very English — the square pianoforte

Two wars were responsible for a slump in German piano manufacturing. One was the Seven Years’ War (1756–1763), in which Central Germany, the center of German pianoforte manufacturing, was particularly hard hit and from which an entire generation of Silberman pupils fled from Saxony to England, at that time an ally of Prussia. Then, in 1823, Napoleon’s troops began to overrun half of Europe. People in the occupied countries had other concerns than buying pianofortes and the industry stagnated, except in England. Thanks to Saxon refugees, and later Erard, the hammer action was becoming popularized in England. It was in London that the Tafelklavier, which was manufactured primarily in the rectangular form of the clavichord and virginal, got its English name square pianoforte.

The origin of uprights

Christian Ernst Friederici, the master from Gera, did not limit himself to the building of square pianofortes. As already Domenico dal Mela, a Cristofori trainee, Friederici designed a vertically configured grand pianoforte, the pyramid (Pyramidenflügel). This idea was, of course, not entirely new. In his work Liber tegunti artium, written in 1462, the erudite Paulus Paulinus (1413–1471) mentions the clavicytherium, a small legless upright harpsichord. Nevertheless, the pyramid was an original invention in the sense that, unlike the clavicytherium, it had a hammer, rather than a quill action and rested on the floor instead of on a table. This was an impressive instrument. There were others: the giraffe (Giraffenflügel), lyra pianoforte (Lyraflügel), and the cabinet pianoforte (Schrankflügel), equipped with doors. In their outward appearance, they remained fanciful arabesques of pianoforte manufacturing, but their action mechanisms helped pave the way for the development of the upright piano.

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Various designs were used for experimentation during the course of the evolution of the first pianoforte to the modern upright and grand piano. Today, many of these charming, sometimes exotic, but always interesting examples of inventive pianoforte manufacturing can be found in various public and private musical instrument collections.

One such intermediate design which occupies an important place in the history of pianoforte manufacturing is the Tafelklavier (later in England known as the square pianoforte). Among the first to produce such instruments in Germany was the renowned pianoforte and organ builder Christian Ernst Friederici of Gera (1729–1780), of the Silberman School. It was on Friederici’s Tafelklaviere that Carl Philipp Emanuel Bach played the sonatas of his Sturm und Drang period. Leopold Mozart wrote his more galant compositions for the pianoforte. The piano proved to be a popular instrument that enabled many a piano manufacturer from the mid-1820’s to earn a good living, including such renowned firms as Steinway & Sons of New York and Helmholtz of Hanover.

Sturm und Drang — the Tafelklavier

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Contemporary 7’2” Schimmel grand of the Konzert 219 series – a superb example of the German art of piano manufacturing.

Modern grand and upright pianos

Hence, it was the upright piano that pointed the way to the future. Although the square piano remained popular in the saloons of America, it gradually lost favor by the middle of the nineteenth century, when quality upright pianos, such as those from Hawkins (Philadelphia), Balcoock and Chickering (Boston) and Steinway & Sons (New York) began flooding the market. Moreover, pianos were being imported from Europe, where piano manufacturing was booming as a result of numerous fledgling piano companies. However, after two World Wars and the changed market many once-famous brand names vanished from the market. In Germany only a few companies survived, among them Wilhelm Schimmel, Pianofortefabrik GmbH, founded on May 2, 1885 in Neuschönefeld near Leipzig.

Schimmel today

Today Schimmel grands and uprights rank among the top flight in the piano industry. Their excellent tonal and playing characteristics are convincing, inviting one to play on them. For decades now, Schimmel has been one of Germany’s best-selling piano. This, of course, means a great responsibility to piano-manufacturing traditions.

Good reasons for the company to have as one of its corporate objectives the cultivation and preservation of traditional piano manufacturing in Germany. Schimmel attaches great importance to the qualifications of its employees. And Schimmel is one of the largest and most preferred training centers for those wanting to learn the profession of piano builder. In past decades, nearly 600 young people have successfully completed Schimmel’s apprenticeship program. Many of them have gone on to complete the five-year journeymanship and pass the master-piano-builder examination. All this demonstrates the confidence which Schimmel has in the future of the traditional piano.
The History of the Hammer Action

300 years of artistry and craftmanship

A prerequisite for a perfect piano sound is a perfectly functioning keyboard/action assembly, something on which piano builders have been working for the past three centuries, resulting today in a complex, but logical system of levers of varying lengths. The mechanical parameters have been the same since Cristofori’s days: (1) to catapult a hammer against a string, or strings, and have it immediately bounce back and not “block”, referred to as let-off, set-off or escapement; (2) to ensure that the hammer is caught immediately after it has bounced off the string so that it does not “stutter”, referred to as checking; (3) to ensure that the hammer is ready for a new blow as soon as possible, referred to as repetition; and (4) to ensure that the slightest variations in pressure on the key result in corresponding variations in the force of the hammer blow, and hence in the volume of sound, referred to as dynamic-modulation capability. The perfection of grand and upright actions as we know them today is the result of over three hundred years of patience, artistry, craftsmanship and inventiveness on the part of innumerable piano builders.

It was not by mere chance

Toward the end of the seventeenth century, the invention of the hammer action, like so many other inventions, was somewhat tenuous. The desire for a keyboard instrument combining the expressiveness of the clavichord with the sonority of large harpsichords was substantial among both musicians and music lovers. Bartolomeo Cristofori fulfilled this desire by providing one of his harpsichords with a hammer action. This remarkable innovation came about, not by mere chance, but because of considerable experimentation with his design over a long period of time. The illustration below of one of Cristofori’s 1720 action models shows how carefully he designed his hammer action, based on the pushing principle. Cristofori lived to see the rise in popularity of the pianoforte, at first gradual, then rapid, but was hardly able to profit from it. Of all the different hammer action designs that evolved over the ensuing years, the original pushing action proved to be the most effective, although for a time there was serious competition from the bumping action.

30 years of artistry and craftmanship

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Hebenstreit – hammers instead of beaters

It is impossible to write about the technical history of the hammer action without again mentioning some of the early instruments previously cited. The dulcimer, and particularly the concert dulcimer, of the virtuoso Pantaleon Hebenstreit, was the first stringed keyboard instrument equipped with hammers rather than beaters. The keyboard, with white and black keys for the naturals and sharps, resembled that of the organ, the clavichord, and the instruments of the harpsichord family. It was only a matter of time until someone would come up with the idea of providing the Pantaleon with a keyboard, i.e. the mechanization of the dulcimer. Similarly, the instruments of the harpsichord family and the clavichord resulted from the mechanization of the psaltery and polyphonia, respectively.
Pushing or bumping – mechanical principles

From the beginning of the eighteenth century, pianoforte manufacturers experimented with various different hammer-action designs. Of the four basic mechanical principles that were tried, only two proved successful: the pushing action (Figs. A and B) and the bumping action (Figs. C and D). The distinguishing feature of the bumping action is that the hammer pivot point moves upward when the key is depressed, whereas that of the pushing action remains in a fixed position, resulting in a more precise striking point.

The hammer action evolved along two separate lines: in a horizontal arrangement for grand and square pianoforbes, and in a vertical arrangement for upright grands, such as the pyramid, and upright pianoforbes. The two arrangements (vertical, horizontal) differ in the position of the hammers and in the direction in which strings are struck.

The action in vertical instruments is located above, below, or ahead of the keys. As a rule, the hammers move away from the player, seldom otherwise. The action in horizontal instruments is mostly located above the keys, with up-striking hammers. The hammers are either facing in the direction of the player or in the opposite direction. A handful of horizontal instruments have down-striking hammers. Their action is located behind or under the keyboard.

Figs. A and C show the vertical arrangement with forward-striking hammers, Figs. B and D the horizontal arrangement with up-striking hammers.

The pushing principle: The pivot point (X) of the hammer shank (1) is movable and is located on a flange attached directly to the back half of the key. As the key is depressed, the hammer pivot point (X) is raised in the direction (2), causing the hammer(-shank) tail (3) to bump up against a stationary bumper rail (P) or a movable and adjustable escapement, catapulting the hammer forward (Fig. C) or upward (Fig. D).

The bumping principle: The pivot point (X) of the hammer shank (1) is movable and is located on a flange attached to a stationary rail (G) of the action. As the key is depressed, the jack (S) pushes up (2) against the hammer butt or roller, causing the hammer to move forward (Fig. A) or upward (Fig. B).

From the Simple Tangent to the Complex Action

The second principal action type was the bumping action (Prellmechanik), which was, in the early years of pianoforte manufacturing, a predominantly southern German, and particularly Viennese, specialty. Thus, it became known as the “Viennese action”. The hammer of the bumping action was a double-armed lever that pivoted on a flange mounted to the key, the back lever arm being referred to as the hammer(-shank) tail (3). As the key is depressed, the hammer pivot point is raised. The hammer(-shank) tail bumps up against either a stationary bumper rail or a movable and adjustable escapement, forcing the hammer to strike the string(s).

Andreas Silbermann’s pupil, the aforementioned Augsburg piano builder Johannes Andreae Stein, adopted Silbermann’s action but improved on it by replacing the stationary bumper rail with individual escapements, each pivoting on its own center pin and fitted with a spring which could be regulated. This resulted in a considerably improved touch. (See illustration on page 34.)
The triumph of the pushing principle

There was considerable and heated debate regarding the predilection for the Viennese or English action during the Viennese Classical period (c. 1720–1827). Haydn, Mozart and Beethoven pupil Carl Czerny ("School of Velocity") found their ideal of expression in the bright, clear sound of the Viennese grand. Beethoven, who swore by his Broadwood grand, Muzio Clementi (1751–1831), and other pianists and composers of the Romantic movement, played on instruments with the English action, so called because London had become the piano manufacturing center of Europe.

Among those contributing to the evolution of the English action was the Silbermann pupil Johannes Zumpe, one of 12 German pianoforte builders who emigrated to England around 1760. It is presumed that he built the first square pianoforte there. He initially used a simple pushing action, but then made the decisive improvement of adding jacks which could be regulated, enabling letoff and a better repetition. The age of the virtuosos was quickly dawning and there was more and more demand for quick and efficient key repetition. This, in addition to the more precise hammer striking point, helped establish the eventual triumph of the English action over the Viennese action.

Transition to the modern grand action

Chopin was the dreamer and poet, Liszt the demon on the keyboard. To enable such virtuoso playing, a further improvement on the English action was needed – the repetition action. The inventor, Sébastien Érard, was, at the time, living and working in London. He added an additional lever to his grand action in 1823, called the repetition lever. The repetition lever prevented the hammer from falling back to rest position immediately following a blow by suspending it, enabling the jack to slip back under the hammer knuckle before the key's return to rest position. He called his action “mécanique à double échappement” ("double-jack action," the repetition lever serving as an auxiliary jack).

Fast repetition wins out

Piano virtuoso and composer Henri Herz (1803–1888) made an important contribution to the industry in about 1850 by inventing the butterfly repetition spring. This improvement simplified Érard’s repetition action to the extent that hammer blows repeated in the most rapid succession were now possible. Érard’s mécanique à double échappement with the Herz repetition spring continues to this day to be the paradigm of grand piano action types.

Vertical hammer actions

The first upright grand, an early forerunner of the modern upright piano, was built in 1739 by the Italian Domínico del Mela di Gagliano. The aforementioned pyramid of Christian Ernst Friederici was among the forerunners of the uprights as well. Although Cristofori’s action was the predecessor of the pyramid action, this is not readily apparent because of the pyramid action’s vertical configuration. The strings of the extant upright instruments were struck from in front or in back, with the dampers located above the hammers.

Upright grands were built until well into the twentieth century; some having unique action designs. One such upright grand was manufactured around 1902 by the American firm Schimmel & Nelson in Fairbault, Minnesota. It was built with a hanging jack action in front of the strings and underneath the keyboard. (See illustration, p. 48)

The transition to the modern upright action

The upright, or vertical, piano rapidly grew in popularity from the year 1802. The actions were always configured vertically and were normally located above the keys. By 1852, uprights resembled, for the most part, those of today. Modern upright (and grand) actions utilize the jack action (English action), vertically configured and positioned in front of the strings and above the keys, with forwardstriking hammers driven by the pushing principle.
The Harmony of Levers

The grand action mechanism

The keyboard/action assembly of a Schimmel grand is the result of an over three-hundred-year evolutionary process. Like all modern-day piano actions, the Schimmel grand action is a jack action, or English action, based on the pushing principle. What happens during the fraction of a second from the time the key is depressed until the hammer strikes the string needs to be described in more detail.

As the key is depressed, it pivots on the balance point (1), causing the back rail to be raised, which in turn causes the capstan screw (2) to push upward against the whipping (3), raising it as well. The jack (4), which pivots on the whipping (3), transmits its upward motion to the hammer knuckle (5), lifting the hammer shank (9) and moving the hammer head (6) towards the string(s).

Immediately before the hammer head (6) strikes the string(s), the jack tender (7) is pushed up against the regulating button (8), tripping the jack tongue (4) out from under the hammer knuckle (5), thus interrupting the direct contact between the jack and the knuckle (Figs. A and B above), and hence the direct contact between the key and the hammer shank assembly, thus being referred to as the “let off”.

As the hammer head (6) continues moving to the string(s) on its own momentum, the front end of the key continues to be depressed until its downward movement is finally stopped by the front-rail punching. This small amount of movement of the key beyond the point of let off is referred to as the aftertouch. The drop screw (10, Fig. B above) limits the upward movement of the repetition lever (11), which pivots on the repetition lever flange, which is mounted to the whippen (3). This results in a slight increase in the lifting force exerted by the repetition lever (11) via the knuckle (5) on the hammer shank (9), due to additional tension on the repetition (butterfly) spring (12).

The hammer head (6) rebounds from the string(s) but is arrested on the rebound by the back check (13), the purpose of which is to keep the hammer from “stuttering.” The hammer knuckle (5) of the rebounding hammer pushes down the repetition lever (11) before the hammer head (6) is “checked.” This increases the tension of the repetition spring (12) and the relifting force exerted by the repetition lever (11) via the hammer knuckle (8) on the hammer shank (9).

Always ready for a new blow

As soon as the key begins its upward return from its fully depressed position, the back check (13) releases the hammer head (6) and the tension of the repetition spring (12) causes the repetition lever (11) to lift the hammer shank (9) enough so the jack (4) can return to its attack position under the hammer knuckle (5). A new blow can now be struck without the key having to return completely to its upper rest position (see Fig. C above).

Balanced touch weight

Another important detail regarding the key-balancing operation: the dynamic touch weight is set in the factory by inserting a lead weight (14), referred to as a key lead, into the key. This is to help partially offset the weight of the action components that are lifted by the key. It is important for the playability that the touch weight be exactly the same for all keys. Touch weight and key balance determine dynamic playing characteristics by acting in combination with the leverage ratios and the angles of the various lever arms of the keyboard/action assembly.

Indispensable – the trapwork (or pedal) system

Unlike that of an upright, the damper action of a grand is not integrated into the hammer action, but is a completely separate unit. The grand piano damper head (16), attached to a vertical damper wire (15), is located directly above its respective string/string unison. Depressing the front end of the key releases the back end (17), pushing upward on the damper spoon (18), lifting the damper lever (19), which in turn raises the damper head (16) off the string(s), for uninterrupted vibration. Releasing the key allows the damper head (16) to return to its rest position on the string(s) stopping the vibrations of the string(s). The lead inserted in the damper lever (19) ensures the correct amount of damper-head weight for proper and efficient damping.

The sostenuto mechanism of the Schimmel grand is an integral part of the damper action that enables the pianist to selectively control the damping and sustaining properties of individual notes or keys. Depressing the sostenuto pedal (middle pedal) causes the sostenuto rod (21) to be turned so that its lip (22) is in its up position (Fig. E and F). The sostenuto tabs (22) of all keys being held down at the moment the sostenuto pedal is depressed are caught by the sostenuto rod lip (Fig. E).

Depressing the sustaining pedal (right pedal) causes the damper-lift rail (23) to raise all the dampers (16) simultaneously, permitting all strings to vibrate freely.

Depressing the una-corda, or shift, pedal (left pedal) causes the entire keyboard/action assembly (with the exception of the damper action) to shift to the right, causing the hammers to strike only two strings of each three-string unison.

Sostenuto pedal not depressed, sostenuto tab (22) and sostenuto-rod lip (20) inactive, damper-lever-wire flange can move freely.

Sostenuto pedal depressed, key depressed afterward, sostenuto-rod lip (20) under sostenuto tab (22), damper returns to rest position on string(s).

Key depressed before depressing sostenuto pedal, sostenuto-rod lip (20) under sostenuto tab (22), damper remains raised.
Modern, reliable Schimmel upright keyboard/action assembly above the keys, pushing principle, forward-striking hammers.

**An Open Secret**

The upright action mechanism

In some ways an upright action resembles a grand action; in some ways it does not. Whereas a grand action’s parts are in a horizontal arrangement with up-striking hammers, in an upright action they are in a vertical arrangement with forward-striking hammers. In both grands and uprights, the keys rest and pivot on a balance rail (1).

Depressing the front half of the key causes its back half to be raised, which in turn causes the capstan screw (2) to push upward against the whippen (3), raising it. The jack (4), which pivots on a flange mounted to the whippen (3), transmits the upward motion of the whippen (3) to the hammer butt (5), causing the hammer (6) to move forward.

Immediately before the hammer head (6) strikes the string(s), the jack tender (7) is pushed up against the regulating button, tripping the jack tongue (4) out from under the hammer butt (5), interrupting the direct contact between the jack (4) and the hammer butt (5) and hence disconnecting the key from the hammer (6), the moment also referred to as “letoff”.

While the hammer (6) is traveling the rest of the distance to the string(s) on its own momentum, the front end of the key continues to be depressed until its downward movement is finally stopped by the front-rail punching (“aftertouch”), causing the jack tongue (4) to completely clear the hammer butt (5).

The hammer head (6) bounces off the string(s), about a third of the way back to its rest position, its backward motion is arrested by the back stop (8) being caught by the back check (9). As the hammer (6) is being catapulted toward the string(s), the tension on the hammer-butt spring (12) is increased. This additional spring tension aids the return of the hammer during extreme pianissimo playing.

Attached to the back stop (8) is the bridle strap (11), which is hooked onto the bridle wire (12). Its purpose is to jerk the hammer head (6) backward after each blow, enabling faster repetition without the necessity of an overly high hammer-butt-spring tension, which would result in a heavier, less responsive touch.

As the key returns to its upper rest position, the jack (4) slips back into its attack position under the hammer butt (5), ready for a new blow. The quicker this takes place, the faster the repetition.

**Trapwork**

The damper system in uprights is an integral part of the action. The damper (13) of the modern upright action is positioned directly beneath the hammer head (6) and is screwed to the damper rod attached to the damper lever (14). When the damper (13) is in its rest position, the damper spring (15) keeps it tightly pressed up against the string(s). When the key is depressed, the damper spoon (16) attached to the whippen (3), pushes the lower end of the damper lever (17) forward, lifting the damper (13) off the string(s), to allow for uninterrupted vibration.

Depressing the sustaining pedal (right pedal) causes the respective pedal dowel to push upward on the damper-rod tongue (18), which in turn causes the damper rod to push the lower ends of all the damper levers (17) forward, lifting all the dampers at once, regardless of whether keys are depressed.

The soft pedal (left pedal) causes the half-blow rail (19) to be pushed forward, reducing the hammer-blow distance, reducing hammer acceleration and kinetic energy.

**A Schimmel keyboard combined with an action from a top manufacturer is one of the secrets of the reliability of the Schimmel upright keyboard/action assembly.**
Anyone who has witnessed the care that goes into the production of the sound-producing assembly of a Schimmel piano has an impression of how good sound is created.

The Origin of Good Sound

Acquired knowledge
A perfectly functioning action is a critical prerequisite for good sound. However, the components of the instrument contributing to the sound also include the wooden backframe assembly, the cast-iron plate, the pin block and tuning pins, the bridges, the soundboard, and the strings.

One might ask how the sound of a piano reaches the ear. The strings are set into vibration by the impulse-like blow of the hammer. These vibrations are then transmitted via the bridge to the soundboard. The vibrational energy of the soundboard causes the surrounding air molecules to produce sound waves. Upon reaching the ear, the sound waves cause the eardrum to vibrate, stimulating the auditory nerve, which converts the vibrations into electrical signals, which are perceived by the brain as piano sound.

Leading piano manufacturing families such as Schimmel have, over a period of several generations, acquired an understanding of music, a knowledge and a sense of artistry and craftsmanship required to create the ideal sound of a fine grand or upright piano.

Backframe and plate
The concept of the backframe is very old in the history of musical instrument making. The origin of this type of construction can be traced to the tubular resonators of the stick and raft zithers. The sound-producing mechanism of the dulcimer, psaltery and box zither consisted of a box-type construction which contributed to the necessary stability of such instruments, since backframe components were not yet used. The term “backframe”, in modern piano manufacturing, refers to the wooden framework supporting the soundboard around its perimeter, maintaining its crown and bearing a portion of the pressure exerted by the strings.

Wooden struts for reinforcement
The backframe, with individual wooden struts for bearing the string tension, was first used in harpsichord building. An interesting example of the transition from the harpsichord to the pianoforte is a harpsichord with a wooden backframe built in Paris in 1754 by Johannes Gourmann, which he later converted into a pianoforte. A trend toward expanding the keyboard compass and the number of strings of the pianoforte developed in the early 1820’s, requiring backframe designs with heavy wooden backposts. Modern pianos are still built with backposts, although most of the string tension is borne primarily by a stable full cast-iron plate.
During the course of the nineteenth century, pianists and composers continued demanding greater volume of sound, compelling the manufacturers to increase the string tension, requiring wires of larger diameters. As the keyboard compass and number of strings increased, the wooden backframe hitherto in use eventually proved inadequate to bear the additional stress. Metal reinforcement was needed. Shortly after 1800, pianoforte manufacturers John Isaac Hawkins in Philadelphia and Alpheus Babcock in Boston started adding individual metal braces at isolated points between the pin block and the backframe in an Irmler grand, c. 1840.

An innovation causes a sensation
A pioneer in this development was Heinrich Engelhard Steinway (1797–1871), who, in the aftermath of the German Revolution of 1848, emigrated to the United States. Americanized his name to Henry Steinway and founded a piano-manufacturing concern in New York. It is in a Steinway & Sons square piano that the first cast-iron plate is found, combined with an overstrung bass. This was most certainly an important innovation. Steinway & Sons patented the combination of a full iron plate and overstringing in 1859 for grands, and in 1866 for uprights. This new type of construction caused a singular sensation at the 1867 World Exposition in Paris. Today, the overstrung bass is standard in all modern pianos, both grands and uprights.

The covered pin block
An important improvement in plate design was the change-over from the half plate with an open pin block to the full plate with the pin block completely covered. The pin block of the half-plate design is part of the wooden backframe assembly. Although the plate presses against the pin block, thus supporting it in the direction of the string tension, the entire buckling load at the pin block must be borne by the backposts. Initially, the portion of the pin block in which the tuning pins were driven was open, but piano manufacturers were soon using a plate which covered the entire pin block, with holes in the plate, today in most cases provided with wooden bushings for the tuning pins.

Metal braces at isolated points between the pin block and the backframe in an Irmler grand, c. 1840

Outpostless back construction
Naturally, over the past two centuries, a number of different backframe designs were developed in upright piano manufacture. One of the most successful of the instruments with this type of construction was designed by Wilhelm Arno Schimmel. He designed a small upright without backposts in the 1930’s which boasted an improved and particularly stable cast-iron plate which bore the entire string tension (about 25 U.S. tons). This instrument gained instant worldwide recognition and many thousand were sold. Today, this type of construction is still in use by Schimmel for the smaller upright models, whereas the larger ones are fitted with backposts.

The Schimmel cast-iron plate
Since the introduction of the cast-iron plate during the second half of the nineteenth century, pianos have undergone a wide variety of improvements in design and construction. Today, Schimmel utilizes modern computer-assisted technology in developing and optimizing its plate designs. These plates have extraordinary stability and a balanced distribution of the material for a bigger, richer, and balanced sound. The cast-iron plate in Schimmel pianos is an integral part of the sound-producing mechanism, in combination with backposts in the grands and larger uprights.

Individual metal braces
During the course of the nineteenth century, pianists and composers continued demanding greater volume of sound, compelling the manufacturers to increase the string tension, requiring wires of larger diameters. As the keyboard compass and number of strings increased, the wooden backframe hitherto in use eventually proved inadequate to bear the additional stress. Metal reinforcement was needed. Shortly after 1800, pianoforte manufacturers John Isaac Hawkins in Philadelphia and Alpheus Babcock in Boston started adding individual metal braces at isolated points between the pin block and the backframe in an Irmler grand, c. 1840.

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The clavichord’s tangents
Monochord with movable
pegs (above)
Stick zither with movable
strings (middle)
The clavichord’s tangents
serve as “movable bridges”
(below)

Bridges: the energy link
The bridge comprises the connecting link between the string and the soundboard, transferring the vibrational energy. It also serves as a termination for the strings. Bridges are the energy link between strings and soundboard.

Rudimentary individual bridges
The two small wooden pegs of the stick zither place the bamboo strip under tension and at the same time serve as bridges. The distance between them, together with the tension and mass of the strip, determine the frequency of the sound, which is conducted through the pegs to the piece of bamboo cane serving as a resonator.

Movable bridges
The bridge of the monochord is movable, so that the speaking length of the string can be selected at will. Metal tangents at the back ends of the keys of the fretted clavichord serve as movable bridges, determining the string speaking length. They also set the strings into vibration.

Fixed bridges
The instruments of the harpsichord family (harpsichord, virginal, spinet) have fixed bridges of solid wood; in the earliest versions, these are of light, delicate construction, and usually provided with only one row of bridge pins, which cause the back-string lengths to form an angle with the speaking lengths, referred to as “side bearing.” Only the later instruments have bridges with two rows of pins, increasing the amount of vibrational energy transmitted to the soundboard, and hence the volume of sound.

Schimmel bridges
Bridges must be stable in order to bear the high string tensions in pianos. For the most pleasing sound, Schimmel decided in the mid-1990s to return to the basics of bridge design, reintroducing solid wood bridges with maple bridge caps, thereby achieving an optimum transfer of the string vibrations to the soundboard. A further advantage of this type of bridge is that it results in a sound in line with today’s musical ideal. The bridges in Schimmel pianos are constructed of carefully selected wood. Additionally, the bridge caps provide a special form.

The soundboard
The soundboard is the soul of the piano. It receives the vibrational energy of the strings and converts it to the form of audible airborne sound waves. A good soundboard converts the string vibrations into sound with a very high degree of efficiency.

Schimmel soundboards
The modern Schimmel soundboard is a paradigm of high efficiency. A high sound velocity in combination with a low specific gravity form the basis of its dynamic properties. The crown and internal stresses of a Schimmel soundboard substantially influence vibrational properties and stability.

Soundboards in harpsichords and pianofortes
Harpsichords and the first pianofortes, with longer string speaking lengths and higher tensions, necessitated more substantial soundboards and bridges, which in turn resulted in noticeable improvements in the volume of sound and the decay time. Soundboards with larger vibrating areas are found in early upright pianofortes as well.

Schimmel soundboards today
Still, it would be several years before the advent of modern, highly efficient soundboards such as are found in Schimmel pianos today. The first thing needed was an improved stability, necessitated by the continually increasing string tensions. Today, a three-dimensional crown, supported by stable ribs, bridges and soundboard liners, produces high internal stresses which prevent the board from collapsing under the down bearing of the strings.

Clavichord soundboards
The soundboard designs of clavichords and early square pianofortes featured small vibrating areas with little in the way of internal stresses and ribs and bridges of delicate construction. The often extremely curved bridges sometimes ran across the grain of the soundboard. This light construction resulted in a sound which was rather intimate in character, yet quite in line with the prevailing tastes of the epoch in question. As late as 1852, comparatively small, thin soundboards were still being used in square pianofortes.


**Tuning Pins and Pin Blocks**

**Individual tensing elements**
The stick zither, predecessor of all stringed instruments, produced varying frequencies according to the vibrational properties of the bamboo strip, depending on its length, weight and tension. A technique had to be developed to place a wooden strip or string under tension. The stick zither’s two wooden pegs functioned not only as bridges, but also as tensing elements.

**Tuning pegs and pins**
The next step in the evolution of tensing elements was the integration of turnable elements in screw form. The first known tuning pegs were made of wood, a material still in use today by makers of bowed stringed instruments. Since wooden tuning pegs are unsuitable for pianos, metal tuning pins were used from the very beginning, the first ones being hand forged. The portion of the pin embedded in the pin block was roughed up with a file for better holding power.

**Modern tuning pins**
Modern tuning pins are made of a high-strength steel, with absolute precision, improvements resulting from progress in the field of metallurgy and modern manufacturing methods. The top portion is square in cross section and slightly tapered, assuring a good seating of the tuning-hammer tip, yet permit smooth rotation, over a period of many years.

**Schimmel introduces the laminated pin block**
Wilhelm Arno Schimmel patented a new type of pin block. In 1956 he had recognized that veneer manufacturing had progressed to the point where it was now practical to replace the two to four layers of the sandwich-type pin block with multiple laminations of beech with the grain running crosswise in alternate laminations. This advancement in piano manufacturing set a new standard for the industry worldwide.

**Solid-wood pin blocks**
The first pin blocks were of solid wood, which remained standard practice for centuries. Wood continues to be the ideal material down to this day.
Upright grand by Schimmel & Nelson, Faribault, Minnesota, U.S.A., 1894, special features including a hanging action and the tuning pins located just above the bottom board. Benedict Schimmel, a brother of Wilhelm Schimmel, manufactured these instruments in both an overstrung (left) and a straight-strung version (right).

Straight-strung upright piano by Broadwood, London, c. 1850. Unlike those of grands, the straight-strung uprights’ strings extended downward almost to the bottom board. In comparison to the upright grands, this results in shorter strings (particularly in the bass) and at the same time permits a considerably more compact outer form.

Example of an overstrung bass, c. 1870

Strings and String Scales

Vibrating strings generate the sound

There are many different kinds of stringed instruments, but the piano produces a unique sound. A sound spectrum must initially be generated, dependent on the impulse and locus of the hammer head striking the string, as well as on the physical properties of the string and sound-producing assembly. This unique special sound spectrum is compelled to vibrate in a typical pattern, which is filtered by the soundboard in such a manner that certain components of it are retained, while others are more or less suppressed. The result of this filtering is the unmistakable pattern of piano sound.

Metal strings

Metal strings have been in use for over five hundred years. The earliest mention of them in clavichord building is found in Musica getutscht by Sebastian Virdung (*c. 1465), published in 1511. In view of the continual demand on the part of pianists since the middle of the eighteenth century for increased volume and dynamic range, piano manufacturers have been compelled to increase string tensions and masses, necessitating the development of special high-tensile-strength music wire. The manufacturing of modern piano wire is a complicated process involving state-of-the-art technology. Schimmel pianos are built using only the highest quality of steel wire, able to produce a clear, full sound and a precise tunability.

String scales

“Scale”, in the piano manufacturing sense, refers to the layout and dimensions of the strings. “Scale designing” refers to the selection of the speaking length, mass per unit length, and tension of each string to cause it to vibrate at the desired frequency.

String scales are calculated using a formula referred to as the “Taylor formula”, devised by the English mathematician Brook Taylor (1685–1731). Schimmel has gone on to include other important factors, such as inharmonicity (progressive sharpening of the partial tones), elastic elongation, inhomogeneity of copper-wound bass string mass, rotational, torsional, and longitudinal vibrations, and decay behavior. Schimmel uses its own computer software, creating the prerequisites for excellent tone quality, tunability and tuning stability.

Example of an overstrung bass, c. 1870
Scales in instruments of vertical construction

The first upright pianofortes had straight-string scales, and were later superseded by overstrung scales. Bass strings were angled to obtain longer speaking lengths in the small “cabinet pianos”. Starting in 1828, Pape in Paris had the bass strings of his “console pianos” configured diagonally across the other strings and he eventually patented this type of design. By 1900, the overstrung bass had become the standard in piano manufacturing.

Toward the beginning of the 1920’s, a decisive step forward was achieved by Wilhelm Arno Schimmel (1898 – 1961). This patent for a full iron plate design for uprights without backposts created the tradition of the Cabinet Pianos, thus providing his company with a new impetus. Today an overstrung bass with the tuning-pin panels located at the top of the plate is the norm.

Scales in instruments of horizontal construction

Through the centuries, piano manufacturers have used the most diverse types of string layouts, both straight or radial string, and overstrung. As a rule, clavicord strings run crosswise to the keyboard, with the tuning pins usually located to the right, while harpsichord strings run approximately parallel to the keys. The square pianoforte, like the clavicord, has a crosswise string layout. The tuning pins are located at the front, in the vicinity of the keyboard, at the back, or at either of the two sides. Modern grand pianos utilize an overstrung bass, with the plain-wire strings running approximately parallel to the keys, and the tuning pins at the front of the instrument.

Schimmel scales

Schimmel pianos are classic examples of the overstrung bass used in pianoforte manufacturing since the beginning of the nineteenth century. All-important parameters for generating an excellent piano sound are skilfully optimized by Schimmel’s own CAPE software (CAPE = Computer-Assisted Piano Engineering).
The titles of purveyors to His Grace the Grand Duke of Saxe-Weimar (1899) and to His Majesty the King of Romania (1909) are honorable acknowledgments for Wilhelm Schimmel.

Appointment document as purveyor to the royal house of Romania, issued by the Royal Saxon Ministry of the Interior.

Four Generations of Piano Manufacturing

Art and craftsmanship
The manufacturing of fine pianos requires both artistry and craftsmanship – an integral part of the Schimmel family tradition. This tradition of skill and personal commitment is cultivated by the entire Schimmel staff, resulting in instruments of worldwide recognition.

Wilhelm Schimmel
Central Germany was the homeland of Silbermann and Friederici and the cradle of German pianoforte manufacturing. Wilhelm Schimmel (1854–1946), son of a precentor, also learned the art of piano making in Leipzig, at that time the home of many piano manufacturers in Central Germany. At the age of 16 he began an apprenticeship as a cabinetmaker. A year later he was making accordions and violins. Musical-instrument making became his first love. At the age of 22, he gave up a secure position as a supervisor in a large cabinetmaking concern in Saxony to start over again as an apprentice piano builder at the eminent Stichel piano factory in Leipzig. Eight years later, his yearning for independence and his confidence in his own abilities motivated him to found his own company.

1885 – the first generation
The history of the Hof-Pianofortefabrik Wilhelm Schimmel began on May 2, 1885, the day on which, in a modest workshop in a town not far from Leipzig, the first Schimmel piano saw the light of day. The young company enjoyed a period of rapid growth, since in those days home music making centered around the piano. As a result of his company policy for rigid quality assurance, the demand for his instruments grew rapidly, to the extent that before the year ended he was compelled to move to larger premises. Within two years, the company had outgrown these as well. On March 1, 1894, after not quite nine years, Schimmel piano opus No. 1022 was produced.

Wilhelm Schimmel (1854–1946)
The Golden Age

Early success enabled Schimmel, in 1895, to erect his first company-owned factory in Leipzig-Reudnitz, his employees now numbering about 32. The founder of the company now belonged to the inner circle of recognized piano manufacturers in Leipzig, the piano-manufacturing center of Germany and the city of Bach, Mendelssohn-Bartholdy, Schumann and Wagner. Schimmel was in touch with the times, offering his customers a variety of reasonably priced models fully in conformance with the tastes in music and furniture of the Gay Nineties. The sound-producing assemblies of his instruments were among the most advanced of that epoch, and the instruments were known for their highly developed repetition actions, a pleasing touch, and a particularly excellent sound. The company continued to grow and in 1897 the factory again had to be relocated, this time to a new factory building in Leipzig-Stötteritz. Schimmel pianos were in the meantime being exported to a number of countries, including Russia, Italy and America. Schimmel piano opus No. 2500 was completed in 1898.

Majesties and medallions

As the company celebrated its silver jubilee in 1910, Schimmel pianos were long since internationally known. Wilhelm Schimmel’s professional knowledge and his irrefutable character won him appointments as purveyor to His Grace the Grand Duke of Saxe-Weimar (1899) and His Majesty the King of Romania (1909). Among the awards that followed were Gold Medallions at the World Expositions held in Leipzig in 1913 and 1914, with one of the independent exposition newspapers commenting on Schimmel pianos as follows:

“It was this upright, the tone of which had first captured our attention, and after testing the performance of the instrument, we must confess that, in its sonority as well as delicacy and beauty of tone, it is in no way inferior to the best uprights of the select few top-selling international ‘name brands’ Bösendorfer, Blüthner, Steinway etc.”

Fifty years of tradition

In 1925, as his company celebrated the fortieth anniversary of its founding, Wilhelm Schimmel was enjoying a high degree of recognition. His pianos were finding acclaim and acceptance everywhere and each instrument was a labor of love, personally designed. He not only cultivated long-standing piano-manufacturing traditions but was open for new technologies. As this epoch saw the heyday of the self-playing musical instruments, Schimmel also produced player pianos. These worked on a pneumatic principle, with the commands for striking the keys coming from holes punched in a paper music roll, which, as with the binary code used in modern-day computers, delivered only yes/no information. Hence, the player piano was among the forerunners of the first IBM Hollerith machines.
1927 – the second generation
In 1927, at the age of 73, Wilhelm Schimmel retired from active management of the company, passing the mantle to his son, Wilhelm Arno Schimmel. This took place as the world economy was going through a difficult phase, culminating two years later in the Great Stock Market Crash on “Black Friday”, Oct. 25, 1929, initiating the Great Depression. In its best years, the annual production of the German piano industry prior to the Great War (later referred to as World War I) had been about 180,000 units. The runaway inflation of 1923, followed by the Great Depression, resulted in a drastically curtailed production. To add to its problems, the piano industry now had to compete with the radio and the gramophone.

As the 1920’s drew to a close, Schimmel and a number of other piano manufacturers reacted to this structural crisis by pooling their resources in a cooperative venture known as the Deutsche Piano-Werke AG, with production facilities in Luckenwalde (near Berlin) and in Brunswick (Braunschweig). Soon Wilhelm Arno Schimmel realized that his strength and his initiatives would not be enough to coordinate the differing interests of the various companies of the group. He seceded in 1931, and successfully continued the family tradition of manufacturing pianos in Brunswick under the name Wilhelm Schimmel, Pianofortefabrik GmbH. This proved to be a stroke of luck, since 20 years later in divided Germany Brunswick belonged to the Federal Republic of Germany, while Leipzig became part of the German Democratic Republic (“East Germany”).

1935 – golden jubilee
During the difficult years preceding World War II, and during the war itself, Schimmel was able to rely on the good reputation of its instruments. In the mid-1930’s, Wilhelm Arno Schimmel had developed a small upright without backposts and a new keyboard/action design. Its petite styling ideally reflected contemporary tastes, and the large uprights of yesteryear having in the meantime become old fashioned and out of style. Additionally, new models were introduced during the 1930’s: the Golden Jubilee upright and the 102 “Fortissimo” series, which for decades to come would be the hallmark of the unmistakable tonal character of Schimmel uprights.

In October of 1944, the factory was completely destroyed in a fire, interrupting the manufacturing. Rebuilding the facilities began as soon as circumstances would permit. Following the war years, the company kept its head above water with all kinds woodworking, manufacturing small tables, furniture for schools, plywood components for trucks and even complete wooden interior work on buildings. And to the surprise of many, already in 1949 Schimmel was exhibiting pianos from its resumed production at the first Export Fair in Hanover, the forerunner of what is now the world’s largest industrial fair.

The 1950’s – confidence in the future
The desire to play music never abates… in good times or bad. Music is a part of human life. This was the basis of the optimism and confidence in the future with which Wilhelm Arno Schimmel led the company into the fifties. In 1950, he gave German piano manufacturing a new impetus with the “Schimmel Line”. A year later, he caused a sensation by introducing the world’s first grand with cabinetry of transparent acrylic plastic, a model which was perfected thirty years later by his son Nikolaus Wilhelm Schimmel. To this day, the acrylic grand stands as one of the company’s image builders, an outstanding achievement in German piano manufacturing, and immensely popular as a concert-tour instrument.

The world’s best-selling German-made piano
Piano sales were booming in the 1950’s and by the end of 1958 Schimmel had become the world’s best-selling upright produced by a resident German piano manufacturer. Schimmel pianos were being exported the world over. Nikolaus Wilhelm Schimmel joined the management of the company in 1959, assisting his father in piano design and marketing activities.

Wilhelm Arno Schimmel provided the piano industry with new impetus with his modern cabinetry designs of the late 1950’s.

In collaboration with world-renowned artist and sculptor Otmar Alt, Nikolaus W. Schimmel introduced a colorful and fanciful instrument with the ability to charm the senses.

Nothing feels more comfortable in our hand than a stone worn smooth by the ocean tides to an ovoid shape. Nothing is more aesthetic than the sweeping form of a sand dune shaped by the wind. This natural beauty and elegance is reflected in the Schimmel Pegasus grand.

A century of tradition and progress
1985 marked the Schimmel centennial and the company could proudly look back on a one-hundred year history of piano manufacturing. From a small beginning in a rented workshop in 1885, Schimmel had grown to become Germany’s leading piano manufacturer, making Brunswick the piano-manufacturing center of Germany.

Toward the end of the 1980’s, the international piano market was hit by a recession, with shrinking sales, requiring downsizing of production. Nikolaus W. Schimmel met this new challenge, as his father did sixty years earlier during the worldwide Great Depression, with creativity and commitment. He promptly reacted to the changing market situation and Schimmel was able to retain its leading position in the Federal Republic of Germany (at that time still consisting only of “West Germany”), with two-thirds of its annual production being exported to other EU (European Union) countries, North America and the Pacific area.

Emerging into a new millennium
Throughout the last decade of the twentieth century, Nikolaus W. Schimmel and his team of piano makers par excellence were hard at work laying the foundations for a new range of the Schimmel Konzert line of grands and uprights. Moreover in close cooperation with the reknowned designers, Prof. Luigi Colani, the futuristic grands and pianos of the Pegasus range were developed. The Schimmel Art Edition grand, a product of collaboration and friendship between the piano maker Nikolaus W. Schimmel and contemporary artist Otmar Alt, is equally extraordinary.
designed software. Although Schimmel cooperates with modern computer programs, including exclusive company-development and production facilities are supported by individual instrument is a labor of love. The research and tradition. Nothing is left to chance. Every detail of each sites for piano manufacture are part of a century-old family wide. The artistry and craftsmanship which are prerequi-

have made Schimmel one of the top name brands world-

Germany’s leading piano manufacturer

Today the company remains Germany’s leading resident family-owned and -operated piano manufacturer. Exempla-

ry design, outstanding workmanship and excellent sound have made Schimmel one of the top name brands world-

A family brand par excellence with forward-thinking initiatives

Half a year after taking over as CEO, in spring 2004, Hannes M. Schimmel-Vogel began blazing a trail for the future of the company. The increased orientation of the company’s activities to meet the expectations and requirements of the customer is at the very forefront. He sets his team ambitious targets in order to pave the way for the creation of a family brand, which in terms of grunds and uprights, will, in the future, span a wider price range. Aside from new, first-class designs for the Schimmel Classic ranges, a wealth of exquisite instruments with high quality intarsia work have emerged. Furthermore, since the beginning of 2004, the range of models has been expanded to include the instruments of the “Wilhelm” brand. With instruments such as these, Schimmel is carrying on the philosophy of the company founder, Wilhelm Schimmel, by building „quality instruments at a moderate price“ (quotation from a catalogue dating from the turn of the 19th century).

Among the best

In France, piano tests conducted by the leading music-trade magazines have a long tradition. Each year, professional pianist test-play grand and upright pianos in various categories for the magazines Diapason, Le Monde de la Musique and Pianiste. Since 1996, Schimmel has been participating in these tests. And each year a Schimmel grand or upright has received the top award for its tonal and playing characteristic – high recognition for the intensive research and development that goes into Schimmel Pianos.
The keyframe must rest uniformly on the keybed, with no spaces in between. This requires skill and a sure eye.

People work here
Wherever appropriate and efficient, modern machines replace manual labor for the heavy work. This in no way is to say that Schimmel pianos are assembly-line products. A product can only be as good as the workplaces of the employees. Schimmel produces quality pianos because Schimmel employees feel comfortable in the work environment. Daylight illumination through sawtooth skylight roofing provides a pleasant atmosphere in all areas of the manufacturing facility except the department where the soundboards are produced, the climatized atmosphere of which requires a flat roof provided with large domelights.

Light and fresh air go together
The factory room climate is adapted to the workforce. The relative humidity in the manufacturing areas is maintained at a minimum of 45%. This coincides with the optimum humidity for the wooden parts of a piano. All manufacturing areas are provided with a constant flow of fresh air from outside, some of which is filtered several times, reused and finally transported back outside in an environmentally friendly manner by exhaust systems for dust and lacquer fumes. Schimmel wastes no energy in circulating, heating and humidifying the air in the manufacturing areas.

Experience and research
Schimmel manufacturing experience and scientific research complement each other, with the goal of producing beautiful instruments with a long service life. Production methods are continually being improved. Schimmel leads the industry by staying on the cutting edge of technology through extensive internal research and development and cooperation with renowned scientists and institutes such as the Wilhelm Klauditz Institute of Wood Research, a member of the world renown Fraunhofer Society in Germany.

The science of vibrations
A prerequisite for creating a piano of exceptional tone quality is a detailed knowledge of the vibrational properties of wood and strings. Schimmel’s years of research and refined calculation methods for scale design ensure optimal results. Employee creativity, experience, internal technical developments and external research are four areas in piano manufacture that have helped Schimmel excel in the industry.

Precise measurements of static and dynamic properties of Schimmel keyboard/action assemblies are made using state-of-the-art equipment and software. Finally, Schimmel is well informed concerning the energy impulses transmitted by the hammer heads to the strings, vital for efficient interaction between the sound-producing mechanism and the keyboard/action assembly.

How Quality is Created
Sound measurements are performed in the anechoic chamber at the Physikalisch-Technische Bundesanstalt (PTB), Brunswick.

Exact to a hundredth of a millimeter, the Schimmel CNC-controlled machining centers assure precision in wood and steel machining.

Diagram showing the stress analysis of a Schimmel grand plate under the loading of 20 tons (U.S.) of string tension.

A harmonious work flow
The internal and external harmony of Schimmel pianos is complimented by a harmoniously organized work flow. For example, in cabinetmaking and the manufacturing of the sound-producing assembly, the selection of the materials, the various steps in the production, and the necessary aging cycles must all be perfectly coordinated. This also applies to the manufacturing and installation of Schimmel keyboards and the ensuing work operations. Here, too, the various operations such as the regulation of the keyboard/ action assemblies and the tuning and voicing of the instruments etc. occur in a harmoniously coordinated work flow.

Responsibility and creativity
First-rate employees build first-rate pianos, and at Schimmel, this knowledge is as old as the company itself. Factory training of the employees is always in conformance with the most modern production methods. Moreover, workers are thoroughly familiar with traditional work operations and techniques. Efforts to upgrade qualifications are always welcomed. Such delegation of responsibility offers management-level employees sufficient latitude for creativity. A pleasant work atmosphere has, over several decades, been created in which everyone can feel comfortable. Team spirit and employee incentives and rewards create a working atmosphere that ensures Schimmel instruments of internationally recognized quality.

The art of piano making
Since the founding of the company in 1885, the Schimmel family has directed the organization with an unmistakable character. Four generations – one passion: the combination of skilled craftsmanship, innovation and family tradition has led to excellent instruments with unique qualities. From the beginning, these characteristics have also been reflected in the appearance of the instruments with their tasteful form and design. Nikolaus Wilhelm Schimmel, who led the company from 1954 to 2002 (its third generation), created highlights that are still unrivalled to date, such as the Glass Grand Piano and the Pegasus Grand Piano, both of which have achieved iconic status. Alongside these spectacular designs, there are also timeless and sophisticated caseworks, lovingly complemented by elegant adornments, which make Schimmel so successful. Naturally, the instruments include high-quality sound performance and brilliant playing capabilities. Overall, the combination of internal and external excellence has remained for generations. Nikolaus Wilhelm Schimmel uses the occasion of his 80th birthday to create 80 limited edition instruments that continue the formula of success.
Piano manufacturing is time consuming – particularly when it comes to the details. The completed piano is only as good as the sum total of all its details, which is why Schimmel employees do not work on conveyor belts. Each one has time to do his / her job properly, as with the sanding of a grand arm shown here.

Choice veneers
Wood is a very special material. It lives. It breathes. It is a gift of nature. Therefore, Schimmel is very careful and judicious in processing choice veneers. Experts match grain structures and colors. Piece by piece, the sheets of veneer are jointed together in a jointing machine, resulting in grain structures with a high degree of uniformity. The jointed sheets of veneer are inspected for color match and workmanship. Each individual sheet is numbered and catalogued. The art of veneer processing is a long-standing Schimmel tradition, evident in the striking beauty and unmistakable character of Schimmel pianos.

No substitute for wood
There is no practical substitute for wood, particularly when it comes to piano manufacturing. Compromises are not tolerated when it comes to sound. The same holds true for cabinetmaking. Today, Schimmel uses various types of wooden materials, including plywood and strip-core panel stock.
Solid-wood stock
Choice woods have a special aura that appeals to the senses. Exotic woods are costly and valuable. The selection and processing of such woods requires expertise and skill at the highest level. Schimmel employees possess such qualifications. Modern drying kilns and additional seasoning assure that the equalized moisture content of solid-wood stock is brought down to 6 to 8%, for long-term retention of integrity and value.

Cabinetmaking
Schimmel carefully selects choice woods, then stores them under ideal conditions. After the appropriate aging period, experienced workers fashion individual parts for precision fitting. Moistureproof wood glues ensure glue joints that hold. The edges of the cabinetry components are either veneered or provided with solid-wood edge strips.

Strip-core panel stock
Strip-core panel stock consists of narrow wooden strips in a vertical arrangement, stabilized by two to three layers of veneer on each side. This type of construction combines the advantages of conventional solid-wood stock with the stability of plywood stock. This type of panel stock, manufactured to Schimmel’s specifications, offers a high degree of stability at a moderate weight.

Plywood stock
Unlike strip-core panel stock, plywood panel stock has a horizontal core. It consists of multiple laminations of veneer. As a rule, the grain of alternate laminations runs crosswise. A decisive factor for the quality and stability of a plywood panel is that it be built up symmetrically with regard to the type of wood and thickness of the veneer sheets, the grain direction, and the number of laminations. Schimmel plywood stock is used primarily for cabinetry components, keyframe rails, and action rails. Here, too, the careful selection of materials is essential to Schimmel quality.
Buffing…buffing…buffing…it takes time to create the mirror-like finish.

Buffing

For decades now, Schimmel has been using special polyester lacquers for its high-gloss finishes. These premium lacquers produce a layer of paraffin on the surface during the hardening stage, which is later removed in a number of sanding operations, each time using ever finer grit sandpaper.

Following the fine sanding, the cabinetry components are rough buffed by machine, using buffing wheels or belts and buffing compound. The final mirror-like finish is created in the fine-buffing operation; the last traces of sanding and buffing marks are removed with rotating buffing wheels and buffing compound. Following this operation, the finish is cleaned and rubbed with liquid rubbing compound until the finish is absolutely flawless.

A flawless mahogany finish is created in several steps. First, the top layer of mahogany veneer is stained, followed by coats of transparent polyester lacquer, then sanded and rubbed with rubbing compound containing wax.

Each detail is important

Each detail makes an important contribution to the quality of the product as a whole. No matter whether made of rare solid wood or high-tech particle board, of finest veneer or MDF materials, each cabinetry component is inspected after having been carefully sanded, stained, and lacquered. Numbers are then stamped on each component, for subsequently keeping the parts together during the following manufacturing steps.

Top-quality finishes

Choice veneers are costly and sanding them requires a considerable degree of skill. The sanding of wooden surfaces is an important and difficult work operation requiring a sensitive touch. Although some of the sanding is done with the aid of modern machines, much of it is still done in the traditional manner by hand.

The art of inlaying

Patience, a steady hand and a love for fine craftsmanship are much sought-after qualities when it comes to inlaying. Surrounded by modern work operations, this ancient art form has been cultivated at Schimmel since the founding of the company. Delicate decorative elements are fitted into place with the utmost of care, in such a manner that after the rubbing operation they form one single unit with the cabinet component in which they were inlaid. The various types of exotic woods form traditional patterns, intarsias of tasteful arabesques. Discreet in form and color, they underscore the respective style of the instrument and impart a subtle touch of nostalgia.

Wet on wet

The ancient art of inlaying is a stark contrast to the modern finishing materials that give Schimmel pianos their high gloss and protect the wood surfaces: polymer resins and other dual-component lacquers. High-gloss finishes require a special technique. The coats of lacquer are applied “wet on wet”, i.e. the next coat of lacquer is applied before the previous one has fully hardened. The time interval between applications is critical for obtaining a completely uniform high-gloss finish, fully enhancing the grain structure of the choice wood or the black of an ebony finish.

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Aging

Wood and veneer stock must be stored under controlled conditions to assure long-lasting integrity and structural stability.

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Today strenuous work operations are done by machines, even in piano manufacturing. But most of the work operations are still done by hand and still require a high degree of skill, for example, the assembly of the heavy wooden backframe assembly of a grand.

Excellent sound-producing assemblies

No substitute for experience
Excellent sound-producing assemblies are the result of a careful and perfect match between the string scale design, the soundboard, the cast-iron plate, and the back assembly. Schimmel’s unique recipe for design and precision manufacturing guarantees a harmonious balance of these components for optimal tone quality.

The soundboard
The sound of a piano can only be as good as the quality of its soundboard. It converts the vibrational energy of the strings into airborne sound vibrations. It must react efficiently to string vibrations within a frequency range of below 50 Hz to above 12,000 Hz (Hz = hertz, formerly c.p.s. = cycles per second). Moreover, the soundboard must be extraordinarily stable in order to retain its crown under the load of the down bearing exerted by the strings.

An extensive knowledge of soundboard spruce and its properties, growing regions, cutting dates and wood density is indispensable.

The configuration of the soundboard crown and the properties of the zones of the soundboard in proximity to the liners, the stability of the soundboard wood and its modulus of elasticity, the internal damping, the velocity of sound vibrations traveling both in the direction of the grain and across it, the location and form of the bridges and ribs, and many other factors determine the characteristic vibrational properties of a soundboard.

Curved components
The inner and outer rims of a grand piano have gradually evolved to the ideal curved form as we know it today. Multiple laminations of veneer are bent into the required shape by heavy-duty presses and are then bonded inseparably together. The selection and quality of the veneer stock used is important.

Back components
The back components include the backposts, the inner rim, the cross block, and the keyboard in grands and the soundboard liners and backposts in uprights. Here, too, the selection and quality of the woods used is critical. The inner rims of grands consist of strong laminated veneers and the soundboard liners of uprights of stable beech.
Quality endures and precision requires patience. Whether bent grand rims (above, left) or soundboards (top), every important component undergoes a climatization process.

The Sound-Producing Assembly

**Grands**
- Soundboards, ribs
- Thermostabilization
- Forming the soundboards
- Crowning the ribs
- Bridge manufacturing
- Completing the soundboards

**Uprights**
- Soundboards, ribs
- Thermostabilization
- Forming the soundboards
- Crowning the ribs
- Bridge manufacturing
- Completing the soundboards

**Conditioning Process**
- Cast-iron plates
- Drilling, lacquering
- Pin-block stock
- Sawing the pin blocks

**Plate setting**
- Special wires (copper, steel)
- Winding the bass strings

**Stringing, first chipping**
- Conditioning process
- Veneer stock
- Preparing the veneer stock
- Bending the outer rims

**Aging process**
- Preparing the keys
- Completion of the sound-producing portions
- Finishing the grand bodies

**Aging process**
- Purchasing of special components
- Important work operations
- Installation of important components
- Conditioning process

Thermostabilizing
Soundboard spruce must be treated with great care. Schimmel soundboards are seasoned in a special environment, where they are bathed in a steady stream of prewarmed air, drying the wood uniformly. Residual moisture content of the wood is then minimized in a drying kiln. This process, referred to as thermostabilizing, in combination with other traditional manufacturing operations ensures quality and stability.

Bridges
The bridges form the link between the strings and the soundboard. They perform several functions. They conduct the vibrational energy of the strings to the soundboard, exciting the various vibrational zones. The bridges also serve to terminate the strings and distribute the downbearing force exerted by the strings throughout the soundboard. The bridges must be carefully matched to the scale design.

Finishings
Lacquer finishes are used in both the cabinetry and the sound-producing assembly. The plates of Schimmel grands are given a multiple undercoat sealer which is sanded and then finished with two coats of lacquer, the final one being high gloss. The soundboards are sanded several times and are finished with a special soundboard lacquer to protect the wood and yet assure free and efficient vibrational efficiency.

Pin blocks
Schimmel pin blocks are exemplary in piano manufacturing. After all, their laminated construction was developed by Schimmel in the mid 1950’s. Schimmel sets high standards for pin-block stock. It must be of outstanding quality, having a certain specific gravity and moisture content, and the glue joints must be impeccable. The laminations of beech veneer are cross-banded, to better grip the tuning pins and ensure a high degree of tuning stability over a long period of time.

The Sound-Producing Assembly

Continuation: page 83
Action setting
Installation of the cabinetry components

Continuation: page 89
Action setting
Installation of the cabinetry components
Heavy molding boxes are used for casting grand plates (above, left).

Wherever machines can take over strenuous work operations, Schimmel spares no expense. An example of this is the machining center for cast-iron plates (above, right).

Wherever quality requires hand craftsmanship, Schimmel spares no effort. The stringing operation requires special care (left).

Cast-iron plate

The Herculean task of bearing the approximately 20 tons (U.S.) of tension exerted by the strings, over 200 in number, is assigned to the heavy cast-iron plate. The foundries that cast Schimmel plates must have state-of-the-art equipment. The plates are machined and finished to close tolerances at the Schimmel factory. More than 450 holes are drilled to a tolerance of less than 0.1 mm. The capo d’astro bar is carefully shaped and surfaced, and premium grade agraffes and a multitude of pins are installed.

Scale design and tonal character

The calculation of the string speaking lengths, diameters, tensions etc. and the determination of the string layout are referred to in the piano industry as “scale designing”. A good scale design imparts to a piano its natural tonal character and timbre and enables the discerning pianist to shape sound. Electronic keyboard instruments cannot perfectly imitate this living sound which has evolved over a period of centuries.

Each string is individually calculated for breaking strength, mass, modulus of elasticity and impedance of the material, as well as inharmonicity. These interrelated factors are computer-optimized by Schimmel’s own CAPE software.

20 tons of tension

A perfect sound-producing assembly consists of a fine soundboard, a solid backframe assembly, and a strong cast-iron plate that form a single unit. While the plate bears the approximately 20 tons (U.S.) of string tension, the soundboard must retain its crown despite the down-bearing force exerted by the strings. This balance of forces reacts to changes in relative humidity due to the progression of the seasons. Wood is a hygroscopic material that expands and contracts with humidity changes, causing string tension to go up and down. This is why pianos must be regularly tuned.

The installation of the heavy cast-iron plate in a grand is a painstaking hand operation referred to as “plate setting”, which can only be done by experienced experts. Its positioning in relation to the bridges and pin blocks must be accomplished with extreme precision. Other important criteria are the correct height of the plate in relation to the heights of the bridges for correct down bearing, as well as a tight fit to the pin blocks.
If the soundboard is the soul of a piano, then the strings are the source of the sounds it produces. Their subtle and complex vibrational patterns are the origin of classic piano sound. Each piano has over 220 strings, each with its own individual speaking length, diameter and tension. Piano manufacturing is truly an art and a craft.

**Strings**

Piano strings must be properly tensioned. Each individual string must withstand a tension of approx. 70 kg to 80 kg (72 kg = 154 lb., or 696 newtons) or more. High-strength steel wire, produced in both round and hexagonal cross section is made especially for the piano industry. The specifications are no less exacting for the copper wire used for bass-string windings. The many wire sizes available for both the steel core wire and the copper winding wire for the bass strings permit a virtually infinite number of possible combinations. Schimmel uses its own computer software in calculating scale designs in addition to the knowledge and experience gathered over a period of four generations.

Stringing is a machine-assisted manual operation at Schimmel. This method of stringing, developed by Schimmel in the late 1960’s, is now in almost universal use in the German piano industry.

**First chipping**

Both upright and grand string backs are first chipped almost immediately after being strung. The term “first chipping” refers to two very rough tunings, in which the strings are brought up to pitch for the first time. Since neither the keyboard nor the action has been installed yet, the strings are plucked. (This was originally done with a chip of wood, hence the name.)

Both uprights and grands are aged following the first-chipping operation. This permits the strings under tension to stretch. It also allows both the strings and the back to stabilize to a certain extent prior to the second-chipping, which is followed by the action “setting” (installation), which is described in the following two sections. Aging is one of the quality features of Schimmel’s manufacturing process. (The complete stabilizing process takes about two years, which is why new pianos need to be tuned more often than usual.)
Hammer heads

The model of his new hammer action presented by Bartolomeo Cristofori to his prince and patron already worked on the pushing principle. Many clever inventors improved on the hammer action with its complex system of levers over a period spanning three centuries. The quality of the hammer heads also improved gradually. The outstanding sound of Schimmel pianos is due, in no small degree, to the ideal hammer heads. The density and weight of the felt, internal stresses and resilience, the type of wool and its processing, the correct cutting and shaping of the felt – each and every one of these factors is of significance for optimum energy-transfer properties of hammer heads.

Hand craftsmanship

The fine, balanced sound of a Schimmel upright is the result, not only of fine hand craftsmanship, but the high quality of the materials used at Schimmel. Although much of the work is assisted by modern machines, wherever appropriate, artistry and hand craftsmanship work together.

Schimmel keyboards

Schimmel is one of the few piano manufacturers producing its own keyboards, both for grands and uprights. There are good reasons for this, one of which is that the leverage ratios of all keys must be precisely matched to the corresponding Schimmel models. Schimmel keyboards are made better by the precision of computer-controlled machines. Schimmel keyboards are superior because of carefully selected wood stock, specially developed capstan screws, special keyboards felts, and a thermo procedure for gluing the felt bushings in the holes for the front- and balance-rail pins.

Inspection and aging

All Schimmel supervisors are master craftsmen. They inspect each keyboard for precise leverage ratios, the correct positioning of the keys in relation to each other, correctly balanced keys, uniform key spacing, and the workmanship of the key bushings. The inspection also includes the key coverings and the sides of the keys. After the keyboards have passed this inspection, they are aged. It is a fact of life that quality takes time.
Platform
The union of the sound-producing assembly and the keyboard/action assembly results in a unit referred to at Schimmel as a “platform”. The platform consists of the insides of the piano, without the cabinet and trapwork, and it can be played.

First regulation
The first, or “rough”, regulation is a first general coordination of the individual levers in the keyboard/action assembly. This operation includes the spacing and easing of all 88 keys, the final alignment of the dampers and hammer heads with the strings, the setting of the hammer-blow distance, the adjusting of the capstan screws and the hammer liftoff, and the setting of the touch weight, a decisive factor for the “feel” when playing the instrument.

First tuning and voicing
The first, or rough, tuning (actually the fourth tuning, counting the three chippings), is performed with the keyboard/action assembly installed. This operation prepares the instrument for the voicing procedure that follows. Voicing is performed by systematically stabbing the hammer heads with fine-gauge needles, altering the tension of the felt, resulting in a pleasingly balanced tone. The location, direction, depth and frequency of the stabs determine the tonal character which the instrument will later have, whether bright or mellow.

Repeated aging between the individual chippings and tunings is important for action and tuning stability. The piano is eventually “played in” by an automatic pianoplaying machine to further stabilize the instrument.

Trapwork
The trapwork consist of the pedal system. A stable bottom board supports the entire trapwork system of the upright piano, from the three pedals to the levers and rods connecting the pedals with the action. It is important that the trapwork assembly be noise free and efficient.

Individuality
Schimmel uprights are available in a variety of heights, styles, colors and finishes. Each instrument is produced individually. The finished piano consists of the platform after the cabinet is finally bonded to it. Each Schimmel upright is a strikingly beautiful and individual creation, whether it be an ebony or white finish, or a choice veneer finish, in satin or high-gloss.

The gluing and alignment of hammers (left).

The key dip is set by inserting paper punchings of different thicknesses—with tender loving care and to an accuracy of a tenth of a millimeter.
Piano music filling the room or whispering in your ears
Schimmel TwinTone grands and uprights represent two instruments in one: A traditional acoustic piano with all features fine Schimmel instruments offer and an integrated "Quiet-Play-Feature" allowing piano playing at any time of the day or the night through headphones. This factory installed "double TwinTone feature" is offered with almost any Schimmel grand or upright. Schimmel TwinTone instruments are equipped with YAMAHA CORPORATION’S SILENT™ Piano Sound Muting System. This product offers a fine piano sound from digital stereo sampling, polyphony for complex playing, adjustable reverb characteristics more.

MIDI – the magic word of musical electronics
The electronic digital-piano unit in each Schimmel TwinTone Piano is provided with both MIDI IN and MIDI OUT interfaces, enabling all MIDI-compatible electronic musical instruments, special-effect units, and music software to be commanded by the keyboard of the Schimmel TwinTone Piano. The digital electronic piano of the Schimmel TwinTone Piano can be played remotely from any electronic keyboard instrument with a MIDI OUT interface.

Silent™ is a trademark of YAMAHA CORPORATION.
Made by Schimmel
There is no substitute for tradition and experience when it comes to the manufacture of fine pianos. Wilhelm Schimmel, founder of the company, had a vision. The quality of his instruments was first and foremost. Today, at the dawn of the Third Millennium, nothing has changed. Schimmel continues to devote all its efforts to the quality of its instruments. The competence and qualifications of the Schimmel staff are indeed valuable assets for guaranteeing top-quality workmanship.

A treat for the eye and ear
The curved form of Schimmel grands is in conformance with the ideal which has evolved over the past three hundred years. Whether the Cabinetry is an ebony or white finish or of choice veneers, whether it is a satin or high-gloss finish, Schimmel grands are a treat not only for the ear, but the eye as well.

The foundation of excellent tonal properties
The sound-producing assembly of a Schimmel grand is its foundation. It is manufactured in the traditional manner and consists of the soundboard, including the ribs and bridges, the back assembly, consisting of the inner rum, the backposts centered in a metal “shoe” and the cross block, the heavy cast-iron plate, the pin block and over 200 strings.

The keybed
The keybed contributes to the stability of the sound-producing assembly of a Schimmel grand. It is made of choice soundboard spruce. A special sandwich construction guarantees its stability. This is significant because the keybed, due to its direct connection with the cross block and the backposts, must absorb considerable forces interacting throughout the overall structure of the sound-producing assembly. The bonding of the outer rim to the inner rim and the installation of the keybed require a high degree of skill and must be accomplished with extreme precision. The vertical distance from the keybed to the strings must be in exact accordance with the specifications of the keyboard/action assembly.

Finishing
Schimmel grands are famous the world over because of the beauty of the cabinetry. The rubbing operation is unique and requires special attention to detail. The process cannot be rushed. The veneers are stained and each coat of lacquer is applied. Although most Schimmel grands are produced in the classic version of high-gloss black finish, referred to as the “ebony finish”, they are also available in white and in choice veneers, in a variety of colors, styles, and finishes.

Schimmel grands – perfection in artistry and craftsmanship

Shimmering beauty. Illuminated by spotlights in various different colors, the Schimmel grand with acrylic plastic cabinetry has been the star of many a TV show and is a masterpiece of German piano manufacturing in both sound and design.
The instrument becomes playable
The cabinet is finished while the first chipping ages. Then the strings are rubbed and the instrument is second chipped, the chiper going over it twice. The keyboard/action assembly and the damper action are installed and then regulated while the second chipping ages, giving the strings and the back assembly time to adjust to the enormous stresses. Now the instrument is playable and ready for the next operation – first tuning (or fifth tuning, counting the two double chippings), in which it is tuned for the first time using the keyboard and action.

“Do it in house”
This was the policy of the founder of the company. Schimmel strives to avoid purchasing componentry from outside suppliers. Schimmel manufactures most of its own grand keyboards. This offers a number of advantages, as previously mentioned. Schimmel grand keyboards also boast other outstanding features, such as computer-optimized key balancing, thermostabilized key bushings, a flexible keyframe, enabling it to be fine-adjusted to the keybed, hardwood inlays in the keys, felts of select quality, nickel-plated guide pins, and special balance-rail studs.

Schimmel takes the time
Every effort is made in the early stages of manufacture to ensure that all the keys are correctly seated for freedom of movement. The sensitive hands of the pianist must not feel any irregularity. Prior to installation, the keyboards undergo a controlled aging process. All the capstan screws must be precisely aligned with the whippen cushions and the hammer heads aligned with their respective striking points on the strings.

Trapwork
Every pianist knows how important perfectly and noise-free functioning pedals are for the interpretation of music, whether classical, pop or jazz. The sustaining pedal (right) affects the damping characteristics after the keys are released and the una-corda pedal (left) controls the volume and character of the sound. The sostenuto pedal (middle) sustains individual notes after the corresponding keys are released.

Una-corda pedal
The una-corda pedal causes the entire keyboard/action assembly to shift slightly to the right, allowing each hammer to strike only two strings of each three-string unison. The contacting surfaces of the keyframe and the keybed are carefully matched to each other to assure a smooth, noise-free shift.

Sostenuto pedal
The sostenuto function is activated by depressing the middle pedal. All dampers which are raised at the time the pedal is depressed remain in their raised position for as long as the pedal remains depressed. All other dampers freely return to their rest position, damping the strings.

All keys must be perfectly leveled (above) and the key dip exactly to specification (left).
A perfectly functioning keyboard and action

Fine pianists, with their fine sense of touch, can feel the slightest movement of the hammers in their fingertips. The piano can only respond perfectly to the slightest variations in pressure exerted by the pianist’s fingers if it is built with a perfectly functioning keyboard/action assembly. Ideal touch and playability is imperative to the concert performer. Due to the ideal horizontal arrangement of the grand piano action, the entire weight of the hammers rests on the keys and the pianist can directly feel the response of each hammer.

Dampers

Dampers are absolutely essential. Each key, when depressed, lifts a corresponding damper. The sustaining pedal, when engaged, lifts all the dampers at once. The dampers can effectively damp the string vibrations only when they function reliably. Each damper must be precisely fitted to its string or string unison, which requires that they be installed with the greatest of care. The size, weight and seating of each individual damper head must be exactly right and the damper felts must be of top quality. The felt must have the ideal hardness and orientations of the fibers. Schimmel grands have five different variations of damper felts to assure smoothness and efficiency of damping.

Durability

A grand keyboard/action assembly must be able to stand up to fortissimo playing. Each and every grand action undergoes a rigid inspection before it is installed. The wood must be of top quality, the reputation springs must have the correct tension, the center-pin bushings must be stable and free of excess friction, and the positioning of the action correct in all three dimensions. Precision action setting exerts a decisive influence on subsequent regulation and voicing procedures.

Hammer heads

The hammer heads are among the most important parts of the action. Schimmel uses only the best. The hammers are inspected for the properties of the felt that determine the sound (type of material and its origin, form, size, weight, and felt tension). Schimmel hammer heads have the correct balance between internal stresses and resilience, to enable the pianist’s fingertips to react to each note individually, a procedure requiring patience and skill.

Hammer head installation

The gluing of the hammer heads to the hammer shanks requires patience and a sure eye. The exact location of the hammer striking point is critical for optimum energy transfer and ideal partial-tone spectrum. Correct striking angle and travel of the hammers is also critical for optimal energy transfer. The face of the hammer head must be exactly parallel to the plane of the string unison.

The secret of last repetition

“Repetition” refers to the ability of the key and action to strike a subsequent blow as quickly as possible. The secret lies in the butterfly repetition spring, the tension of which is increased when the hammer rebounds from the string(s), enabling the jack to return to its “firing position” under the hammer knob at the slightest upward movement of the key. The repetition spring tension must be precisely set for each note individually, a procedure requiring patience and skill.

The back check is also a part of repetition. Its purpose is to “check” (catch and hold) the hammer at approximately its half-stroke position after it bounces back from the string(s), to keep it from “stuttering.” The back check must be set at a precise position and angle to make secure and controlled catches, yet immediately release the hammer tail as soon as the key begins its return and repeat (upward) movement.

The term “hammer drop” refers to the first point at which the hammer comes to rest during its upward movement when the key is depressed very slowly. This point is an important criterion for the return of the jack under the hammer knuckle, and hence for the outstanding performance that grand actions offer both in the way of repetition and dynamic-modulation capability.

First regulation

No component of a Schimmel grand passes from one work operation to the next uninspected. Frequently the same operations are repeated with ever-increasing precision. This requires patience and a love for hand craftsmanship. The keys are checked for correct friction and freedom of movement, spaced and levelled, properly “weighted-off” (i.e. the setting of the touch weight of each individual key) and the setting of the key dip, the hammer-blow distance, and the letoff. All these regulation procedures are done by hand. Then, the instrument is playable for the first time and the first tuning and first voicing, or rough needling, are performed.

First tuning and aging

The first-tuning operation (or fifth tuning, counting the two double chippings), is performed with the strings being sounded by the keyboard/action assembly. The tuner uses heavy, repeated blows, which have a profound stabilizing effect, “setting” the strings. The first tuning is followed by a further aging, beginning with a “playing in” by an automatic piano-playing machine. This serves not only to stabilize the regulation operations carried out up to this point, but also supports the time-consuming processes in which the internal stresses and behavior of the individual materials in the back and the hammers adjust to each other.
Cabinet assembly
The cabinetmakers assemble the individual cabinetry components piece by piece. The two-piece top, including the lock rail and the long and short topsticks, the music desk, the fallboard, the keyslip, the legs, the pedal lyre, and any individual decorative elements are all installed. Schimmel fits each grand with a unique hydraulic mechanism to keep the fallboard from slamming shut accidentally.

Second regulation
Many procedures are performed multiple times. Tuning, voicing, and keyboard/action regulation operations are “tweaked”. Keys are again inspected for freedom of movement and checked for positioning in relation to each other. The key leveling and key dip must be correct and the playability of the instrument as a whole must be reliable at all dynamic levels. The second regulation also includes an inspection, and tweaking where necessary, of the letoff, the “(hammer) drop”, the checking of the hammers, and the repetition. These regulation operations all take time, skill, and patience.

Second tuning
The second, or final fine tuning (or sixth tuning, counting the chippings), is done at Schimmel by an experienced ear tuner. Electronic tuning aids with a visual display are available to assist the ear, but the eye can never replace the ear. Generally, modern-day tunings are done according to the 12-tone equal temperament, in which the semitone intervals are in a ratio of $1: \sqrt[12]{2}$, with $A_1$ (A above Middle C) tuned to a frequency of 440 Hz (cycles per second). The interval ratios remain constant, but the size of the respective intervals increases progressively, doubling with each higher octave.

According to one top expert on historical tunings, Owen H. Jorgensen, in his book “Tuning…”, the theory of equal temperament dates back to the twenty-seventh century B.C. in China. Eighteenth-century European mathematicians were able to calculate monochord string lengths and the fretting distances for lutes for the 12-tone equal temperament to a high degree of accuracy, but an aural method for constructing it on a keyboard instrument had not yet been devised. Skilled piano tuners have been able to do so by ear with mathematical precision since about 1917, organ tuners since about 1810. Prior to that, keyboard instrument tuning was a pure art and various unequal temperaments were used.

Today, tuning is an exact science and skilled tuners produce an identical equal temperament on the same make and model of piano, whether with or without an electronic aid. Unlike the tuning of an organ or electronic instrument, a piano tuning must be modified to adapt to the inharmonicity (progressive sharpening) of the overtones. The aural tuner does this instinctively. An electronic tuning aid must be repeatedly readjusted during the tuning, and techniques for doing so have been developed. Modern aids have a built-in computer on preprogrammed tuning curves for optimizing the tuning. In a comparison test with a purely aural and an electronically assisted tuning conducted at a recent Piano Technicians’ Guild annual convention in America, the test audience rated both tuning excellent.

“The Schimmel grand series K 219 embodies perfect tonal characteristics.”
A good investment
A Schimmel grand provides its owner with many years of reliable service. It is a good and sound investment. But you do not have to take our word for it. You owe it to yourself to pay a visit to your local authorized Schimmel dealer and try our instruments out and experience for yourself the joy of playing on a Schimmel piano.

Second voicing
To quote from a Schimmel Silver Jubilee publication from the year 1910: “The work is finished”. Today, the work is finished after the voicer has given the instrument its “finishing touch”. The piano must be in perfect tune for the voicer to create the beautiful tonal character of a Schimmel grand. Each individual hammer is fine-needled and sanded. This operation also includes an inspection (and, if necessary, a correction) of the leveling of the hammer heads and the strings, the striking points, the string bearing points, the tuning, and the regulation.

Final inspection
The range of the dynamic-modulation capability of a Schimmel grand extends from a whispering pianissimo to a thundering fortissimo. Pianists expect balance tonal characteristics throughout the entire compass of the instrument at all loudness levels. Only an experienced master piano builder performs the final inspection. He pays particular attention to the sound. It must be rich and beautiful, yet warm and capable of dynamic modulation. The keyboard/action assembly must have a uniform touch weight and key dip, reliable hammer checking, fast repetition and a good aftertouch feeling. In short, playing on a Schimmel grand must be a pleasure for years to come.
Sometimes when I’m sitting in a concert hall a picture comes to mind. I’m listening to, watching, and admiring how a pianist is interpreting one of the great piano compositions. I’m trying to mentally absorb the structure and depth of thought of the work, but it’s so easy to get carried away by the magic of those sparkling arabesques and the poesy of the sound, by the virtuosity of fluent runs, by the glittering arpeggios, and the ponderous, vigorously thundering chords. In my mind’s eye I’m reading the metaphor, so popular with music critics, of the “grabbing paws” of the pianist. I hear the applause swell up, sometimes including enthusiastic bravos, calling for not just one, but even two or three encores. I see the artist, one hand resting in the piano taking a bow, whether a cursory one or a long, deep one with theatrical grandezza. I see the performer, basking in the tumultuous ovations, smiling, whether happily, gratefully or just to be polite – who knows? Perhaps the serious facial expression is in anticipation of the loneliness of the awaiting hotel room. The artist is either standing alone on the podium, or together with the orchestra in a semicircle, members discreetly tapping on their instruments with their bows, while the conductor shakes the performer’s hand.

Then another picture comes to mind. I see those who aren’t in the limelight. These individuals are not really bitter, as was Bertolt Brecht: “Because some are standing in the darkness, and the others are standing in the light.” They simply are not in the limelight and remain behind the scenes. Some perhaps do not expect the recognition and even prefer not to be in the limelight. Nevertheless, I see many individuals whose work behind the scenes will never be acknowledged in a concert hall. Of course, I am referring to the many people associated with the piano manufacturing industry. I refer to the artisans that build...
these wonderful concert grands, in which soloists find fulfillment in music. I refer to the instruments which unfold under the hands of the pianist their full, rich sound, whether in a classical music concert, a jazz session or a pop concert. These are the instruments which can reproduce the finest pianissimo, the tuning of which holds up to any "pianist paw," the flawlessly functioning keyboard and hammer action of which serves to produce a perfect sound. These instruments were created by people who are piano builders by profession. Certainly the piano building profession can be learned, whereas a performance career must extend far beyond all learnable playing techniques into those areas which simply can’t be learned – talent, intuition, creativity, personal aura, sometimes even genius.

However, it is not my purpose here to compare the craftsman, as competent as he might be in his profession, with the artist. They can’t be compared. I merely want to point out that since the invention of the first pianoforte over three centuries ago, piano builders have built pianos following all the rules of their art and craft, with all the conscientiousness and skill demanded by their profession. To be sure, pianos have become ever more perfect in sound and playing characteristics, thus creating more than ever before the prerequisites for great artists to display unprecedented keyboard virtuosity. Undoubtedly, there are countless numbers of extant piano compositions without which the world of music would have been infinitely poorer.
middle class. The piano as a vogue instrument was always good for a satire or a brilliantly witty series of drawings, such as Der Virtuos by Wilhelm Busch. The piano would eventually become the world’s most popular musical instrument thanks in no small part to the many unknown piano builders who have made important contributions. The French author, music enthusiast and Nobel Prize winner André Gide expressed his conviction in his Remarks on Chopin: “The piano surpasses the orchestra like the individual surpasses the mass.” The dawning era of the virtuosos saw the likes of such piano legends as Chopin, Liszt, Thalberg, Dresyschoek, Herz, Moreau, Gottschalk, just to name a few. Facts and fiction, evaluation and appreciation, anecdotes and colportage, not only on the sensational finger dexterity of the “keyboard lions” of the early nineteenth century, but on their narcissistic theatrics and shortcomings as well, fill volumes. And what wouldn’t we give to have their playing preserved on phonograph records! The history evolves through Clara Schumann and beyond, into the twentieth century with names such as Anton Rubinstein, Ignacy Padierewski, Vladimir de Pachmann, Leopold Godowsky, Busoni, Rachmaninoff, Cortot, Schindel, Arthur Rubinstein, Vladimir Horowitz and Sergei Prokofiev. At almost every world piano competition new names pop up, some of which sink into oblivion – or already have – in the mad scramble for places in the limelight … names such as the little-known gifted young Greek pianist Loris Margaritis.

They have remained anonymous, these innumerable piano builders, with the exception of the most ingenious among them, who, with their inventions and improvements over the past three centuries, have advanced the art of piano building to its present state of perfection. Some such names are found on the fallboards of pianos whose founders, family members, and employees introduced such inventions and improvements.

The early pianoforte carried the stigma of being a "mechanical" instrument. After all, unlike bowed stringed instruments, its sound was produced mechanically. It would be several years before that stigma would be shed and a legend could evolve, as it were, around the piano. Piano builders did not cultivate a legend like the violin makers. The legend of Stradivari and his imprisonment and the special lacquer that he used is one of mystique and romance, the secret of which is from time to time “rediscovered.” Piano builders are scarcely in a position to offer "romanticisms" such as this. Developments always took place on a more circumspect, pragmatic level. These craftsmen pondered over technical improvements, leverages, the pushing or bumping principle, the use of metal in back construction, string scales, with or without overstringing, the optimum designs for bridges, hammers and soundboards. The many steps in the evolution of the piano described and illustrated on the preceding pages of this booklet help tell the story. This isn’t the stuff that makes legends and myths. Moreover, the piano won over not only the concert halls, but the salons of the nobility and the rich and, by the nineteenth century, the parlors of the
Margaritis had the good fortune of being heard as a nine-year-old in Munich in 1903 by Thomas Mann, who used him as the real-life model for the character Bibi Sacellaphylas in his novelette *Das Wunderkind* ("The Child Prodigy"). written as a feature for the Vienna newspaper *Neue Wiener Presse*. The young Margaritis was immortalized in a literary work which in a delight to read and, with the art of its flowery language, became a eulogy to piano playing in general. A sample: "It is this tingling feeling of happiness, this silent shiver of pleasure, which runs up and down his (the child prodigy's) spine every time he sits down at an open piano – he will never lose it. Again the keyboard presents itself to him, these seven black-and-white octaves, among which he so often loses himself in adventure and destinies that deeply stir the emotions … It is music, in all its height, width and depth, which lies before him. It lies spread out before him like an enticing sea, and he can dive in and float blissfully, let himself be borne by the waves and suddenly sink in a storm, yet without ever losing the complete control which he holds in his hands.…"

Unfortunately, such a eulogy has scarcely been sung to the prosaic work of the many anonymous and deserving piano builders. These are the unsung heroes of the past three hundred years that have successfully plied their trade with the necessary tools, with their artistry and craftsmanship. They have made an indispensable contribution to countless millions, famous and not-so-famous, and the world and joy of music on 88 keys.

"Schimmel – Where the integrity of modern design and classical craftsmanship cross paths."
– Leney Kravitz
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