Opening a Window on the Enlightenment

A Research Organ for the Eastman School of Music

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EROI at the Eastman School of Music

THE EASTMAN SCHOOL OF MUSIC in Rochester, New York was the brainchild of the philanthropist George Eastman, founder of the Eastman Kodak Company. We know that George Eastman was personally fond of the organ. He installed a 129-rank Aeolian pipe organ in the conservatory of his palatial home on East Avenue in Rochester. The main duties of the School's first organ professor Harold Gleason included playing at Eastman's home every morning at breakfast. Eastman saw to it that the school's facilities were state of the art, creating a fully realized vision of organ education for the twentieth century. He was also professionally interested in training organists to accompany silent film: when the school opened its doors in 1921, it was possible to study both "theater organ" and "legitimate organ" playing.

Organ education has become broader and richer in the last eighty years as forgotten and neglected repertories and instrument styles have been the objects of energetic attention from performers, scholars and organ builders. The Eastman Rochester Organ Initiative, or EROI, was launched at the Eastman School of Music in 2002 to update and expand Eastman's organ facilities and create a new state-of-the-art collection for the twenty-first century. EROI has also organized annual international organ conferences, often with the cooperation and direct support of the Westfield Center. EROI has three flagship projects: the largest historical Italian Baroque organ in North America was installed at the University of Rochester's Memorial Art Gallery in 2005 after a careful restoration in Germany by Gerald Woehl. The renovation of Eastman's historic E.M. Skinner organ, a fine example of American orchestral organ building in almost original condition, is also under way. The third project entails the creation of a new instrument, to be called the Craighead-Saunders Organ after two venerable organ professors of the Eastman School, David Craighead and Russell Saunders; this has recently been installed on a new wooden balcony in Christ Church, a large neo-gothic stone Episcopal church and former Cathedral directly across the street from the Eastman School. This instrument is a process reconstruction (a term I will try to further elucidate in this essay) of a late Baroque organ by Adam Gottlob Casparini, and was built at the Gothenburg Organ Art Center at the University of Gothenburg in Sweden (GOArt). An international reference group of organ builders was formed for this project including five of the foremost American builders working in this style: Steven Dieck, Paul Fritts, Bruce Fowkes, Martin Pasi, and George Taylor. In what follows I will describe the central aspects and implications of this very unusual and far-reaching collaborative project.

A New Organ in an Old Tradition

The object of research for the new Craighead-Saunders Organ in Rochester is an antique organ in Vilnius, Lithuania. The master organ-builder Adam Gottlob Casparini of Königsberg built the original instrument in 1776 for the Holy Ghost (Dominican) Church in Lithuania's capital city. Thanks to the work of the Lithuanian organ builder, restorer, and expert Rimantas Guças, the Casparini organ today is one of the best-preserved late Baroque organs in northern Europe. Guças was able to establish which Casparini built the organ by studying a signature hidden on the organ case. Further, thanks to his vigilance over many years and under extremely difficult conditions during the last half of the twentieth century, no invasive restoration or renovation of this instrument was ever carried out, an impressive fact that can be touted about far too few organs in western Europe.

The Casparini organ-building family was well known in Europe during the seventeenth and eighteenth centuries. The first representative to become famous was the master organ-builder Adam Caspar(i) who lived and worked in Silesia in the seventeenth century. His son Johann (1623-1706) moved to Italy while still quite young. He worked there for many years and Italianized his name to Eugenio Casparini, and it is under this name that he is known in the history of European organ culture. Eugenio Casparini became well known as an ingenious master who was full of original ideas. He both enriched the Italian organ traditions with the achievements of central Europe and also brought back to central Europe some important aspects of Italian organs. His famous 1703 "Sun Organ," in the Church of St. Peter and Paul in Görlitz, so called because of the playful fields of small pipes arranged in circles in the façade, survived until 1926, five years after the Eastman School opened its doors. Regrettably, it was destroyed to make room for a new pneumatic instrument in the old case; and too little information about Eugenio's instrument-building style remained in order to justify a reconstruction in 1997 when a completely new instrument was placed in the old case.[1] Eugenio Casparini's son Adam Orazio (1676-1745) and his grandson Adam Gottlob (1715-88) were also organ-builders. Adam Gottlob apprenticed in his father's workshop, and eventually, after working under other well-known masters of that time, among them the famous Heinrich Gottfried Trost (1681-1759), he inherited his uncle's organ-building privileges in Königsberg. He then built at least forty-four organs, many of them in the churches of Königsberg and the surrounding towns and villages. He also built several organs in Lithuania. The 1776 Adam Gottlob Casparini organ in Vilnius is the only full-sized example of this famous family's instruments that has survived intact.[2]

About the Casparini Organ

The organ has two keyboards and a pedalboard, thirty-one stops and three so-called toy stops.[3] At the time it was built, this was considered to be a large instrument. Adam Gottlob Casparini built the case of the organ with the help of local craftsmen, who decorated its façade with elegant Baroque carvings as well as the sculptures of King David and the seven angels that presently crown its façade (see figure 1). The case was painted ivory with polyment gilded moldings and inset frames in the case beams painted with smalt blue–a pigment made of ground cobalt, potash, and calcined quartz (see figure 2).[4] The insides of the organ, the windchests for the pipes, the mechanical action, the keyboards and the organ pipes were all manufactured in Königsberg and brought to Vilnius.

The six original oak windchests have been carefully restored by Rimantas

[1] Mathis Orgelbau, "Sun Organ of the St. Peter and Paul Church in Görlitz (DE)," pdf at http://www.mathis-orgelbau.ch/rtf/goerlitz_e.pdf, accessed January 2008.

[2] Ausra Motuzaite-Pinkeviciene, "Adam Gottlob Casparini and His Organs" (DMA diss., University of Nebraska, 2006), 8-14.

[3] These include an acoustical drum, a cymbelstern that rings four bells in each of the two pointed towers while two wooden stars rotate in the organ façade, and a glockenspiel that plays thirty tuned French dome clock bells from the upper keyboard of the organ starting at the G below middle C.

[4] Over the course of more than two and a half centuries the façade was repainted several times, but restoration specialists have been able to remove the later layers.

Figure 1 *The façade of the 1776 Casparini organ in Vilnius before the restoration. Photo: GOArt archive.*

Guças in cooperation with the Kristian Wegscheider organ-building firm in Dresden, Germany. All but three stops of the organ are original and complete.[5] The metal four-foot stop in the pedal is missing, as well as half of the Flute and Quint Bass (marked 8-foot on the label, but in reality it is a two-rank

[5] See Appendix I for the complete specification of the organ.

Figure 2 *A vertical beam of the 1776 Casparini organ case, painted smalt blue with polyment gilding. Photo: GOArt archive.*

stop of pipes at 8- and 6-foot pitch); the Vox Humana from the Claviatura Secunda lacks its resonators, tongues and boots because it was rebuilt into a free-reed solo stop that was more popular in the nineteenth century. As part of a recent international research project on the qualities of historical brass called TRUESOUND, the organ-builder Janis Kalnins of Ugale in Latvia has recreated the Vox Humana for the original instrument in Vilnius. GOArt, participating

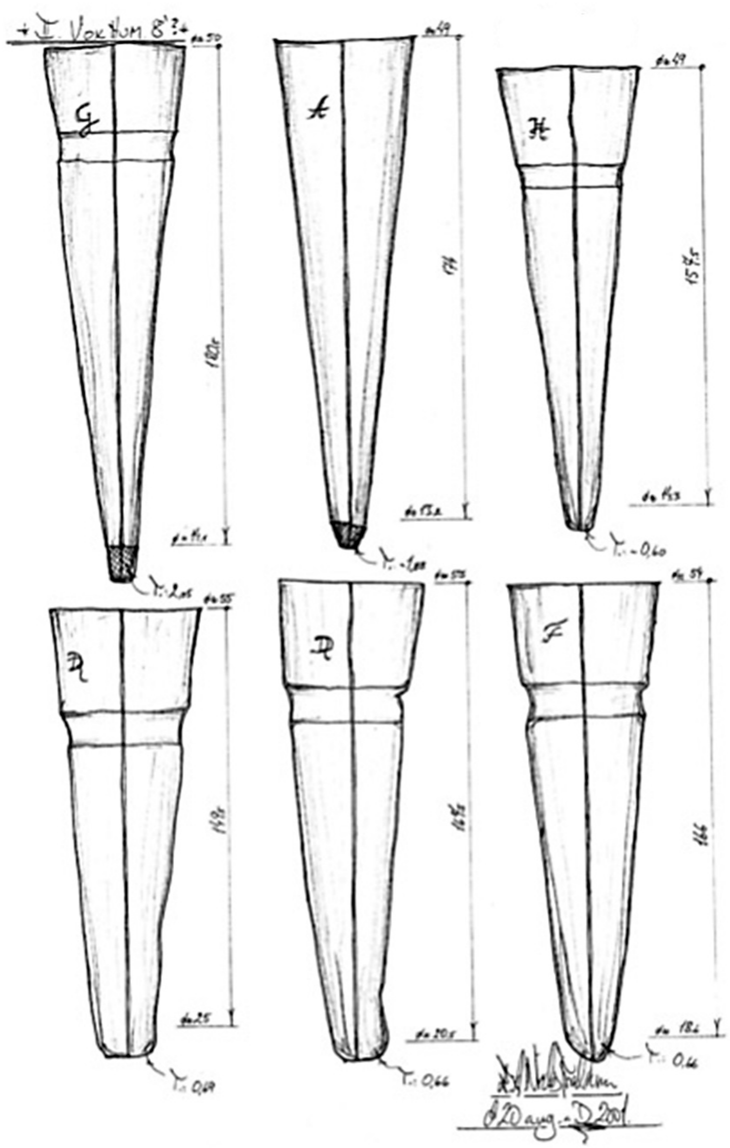

Figure 3 *The surviving resonators of the original Vox Humana reused as flue pipe feet, discovered by Niclas Fredriksson during the documentation. Drawing by Niclas Fredriksson.*

in the same project, has reconstructed the stop for the research instrument in Rochester. The few existing models judged relevant for the time and place were studied carefully, and the scaling was recreated from a few surviving resonator parts that were discovered by Niclas Fredriksson during the documentation and judged to have been reused in the nineteenth century as replacement feet for some damaged flue pipes (see figure 3).[6]

Many of the wooden pipes are made of pine, although the pipes below about three-foot length have fronts made of oak, and the pipes below about one-foot length have all four sides made of oak. The organ also makes extensive use of linden wood for trackers, toeboards and various wooden wind conductors. The keyboard naturals and keyframe were veneered in ebony.[7] The metal organ pipes are made of two tin and lead alloys: the pipes in the façade are made of about 75% very high-grade tin, and have a sonorous, strong and pleasing color; and an alloy containing only about 12% tin was used for the inside pipes.

The whole bellows system is original and consists of six wedge bellows that can be foot-pumped, placed in a separate room behind the organ. It is very rare that a bellows system from an important historical organ remains original and in use. For this reason, the Casparini organ in Vilnius is immensely valuable both as a fine musical instrument and as a study object to document a complete working wind-system from the late eighteenth century (see figure 4). In short, this organ contains information hardly to be found in any other restored Baroque organ in Europe. The original instrument was not widely known in the West until the early 1990s when a joint Swedish-Lithuanian effort began a conservation of this object that continues to this day. A team led by GOArt completed the documentation of the original organ in 2000, making it the ideal project for Eastman and Christ Church in Rochester.[8] This combination of documentation, restoration and reconstruction is at the heart of GOArt's concept of research building.

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6 E. A. Niclas Fredriksson, *Casparini Orgeln från 1776 i Vilnius Helgeands eller Dominikanerkyrkan* (Gothenburg University: GOArt, 2001), 105.

7 Because the original keyboards have not survived, the reconstruction used as its model the remains of the only known surviving original keyboard built by Adam Gottlob Casparini, that was found preserved inside the organ case in the village of Bartos (in what is now Poland).

8 Fredriksson, *Casparini Orgeln.*

Figure 4 *The bellows room in Vilnius. Photo: GOArt archive.*

What is Process Reconstruction?

The concept of the style copy is not new. Organists live with the constant challenge of teaching and performing an enormous range of organ literature while often having limited access to stylistically appropriate instruments, and so the impulse has been with us for some time to use an instrument in the style of Silbermann for Bach's music or in the style of Arp Schnitger for the north German repertoire, to name just two typical examples. Research building proposes to take a scientific approach to finding out more about individual instruments from our shared historical organ culture. It takes as a premise the idea that new knowledge about a historical artifact can be gained through the physical act of copying: by thinking with the hands, rather than only documenting the object with the eyes. The primary differences between modern style copies and process reconstructions lie in their motivations. Whether the instruments are built by commercial firms or research organizations, the primary goal of a process reconstruction is a desire to learn and document as much as possible about the original artifact, and the process of the reconstruction is designed to resist traditional commercial pressures as much as possible. What do we mean by commercial pressures? A commercial style

copy is built for a customer in a modern context, and the customer and actors around that customer are able to influence everything from the materials used, to the size and make-up of the disposition, to decisions about tuning and wind pressure, acting from a wide range of motivations spanning from personal taste to generally accepted current ideas about the pragmatic modern use of organs. There is, of course, nothing wrong with this. We might call it our living instrument culture. But one does not have to go far down this road before the resulting style copy becomes a compromised source for knowledge about any original model and its context.

We all recognize that the original organ was the product of a set of its own commercial influences at another specific time in history, and therefore in the process of reconstruction it is inevitable that various aspects of the instrument's original context are left unreconstructed. The sociologist Madeleine Akrich writes that every technical object participates in "building heterogeneous networks that bring together actants of all shapes and sizes, whether human or nonhuman. … But how can we describe the specific role they play within these networks? … The answer has to do with the way in which they build, maintain, and stabilize a structure of links between diverse actants."[9] These objects, then, become actors in networks of meaning, and in studying them "we have to move constantly between the technical and the social."[10] Akrich suggests that a description of all of the links that make up a network around a technical object can be called its "sociography." Complete authenticity in reconstruction would then necessitate recreating this sociography in its entirety—that is the full web of meaning that the artifact possessed in its original context. Clearly this is an impossible task, and yet such impossibility should not call into question the validity of reconstruction itself as a methodology for increasing our knowledge about the past.

One very important aspect of the sociography of historical organs—one that I believe is eminently reconstructable if care is exercised—has to do with the way in which the music that was created for the organs by their original users is a direct result of those organs' specific technologies. Put simply, the way an organ works inspires some kinds of playing more than others. A specific organ technology automatically supports certain ways of organ improvisation,

[9] Madeleine Akrich, "The De-Scription of Technical Objects," in *Shaping Technology/Building Society: Studies in Sociotechnical Change*, ed. Wiebe Bijker and John Law (Boston: MIT Press, 1992), 205.

[10] Akrich, "De-Scription," 206.

and in turn helps to elucidate compositions that document specific patterns of musical language. An Italian historical *voce humana* inspires the improvising of elevation toccatas as surely as a four-manual north German organ inspires the improvising of multiple echo passages. The original technology is often, though not always, the best place to explore and research these symbiotic effects between organ literature and organ technology. Not always, because the complex system of a specific organ technology that includes the original voicing, tuning, temperament, keytouch characteristics, registration possibilities, winding, and hundreds of other small factors, is so complex as to be easily distorted on historical organs through time. The goal is that a process reconstruction ought to function as well as, or *better* than, the rebuilt, re-voiced and otherwise compromised original artifact that was its model.

As research builders, then, our evolving task becomes more complex than that of writing an object's sociography, because when an object in current use becomes a historical artifact, it accrues, builds, and stabilizes new networks of meaning. This is especially true in the case of buildings and historical instruments that have long lives after those who created them and their culture are gone: they may become stabilizers of new networks of meaning that have equal historical validity. For an example of the historical value of these new networks, one only has to contemplate the debate around the famous Aa-kerk organ by Arp Schnitger in Groningen, the Netherlands.[11] The Aa-kerk organ has a large Oberwerk division from the nineteenth century that makes it possible to play later music, but obscures to some extent the original Schnitger technology. Later this division was enclosed in a swell box. The stop list is different from Schnitger's original one; the windchests have been rebuilt; and the organ is deeper than it used to be and no longer has its original case back. To remove the Oberwerk division and return the organ to its original state, as some have recently argued, might permanently damage even more original material, while being no guarantee that the resulting instrument will have more historical integrity than it has now in its current evolved state. The process reconstruction allows for a way out of these dilemmas without compromising any historical material. If conserved in its current state, the information presently in the Aa-kerk organ can also be preserved and read by future generations as a guide for recreating new instruments that could more accurately represent the organ in

[11] Paul Peeters, "The Groningen Aa-Kerk Organ: Restore or Conserve?" (Paper given at the meeting of the Organ Historical Society, *New Dimensions in Organ Documentation and Conservation*, at the EROI Conference, Rochester, N.Y., October 2007.)

each of its historical states. If an invasive restoration were carried out, we might ponder: will our students' students react the way we now react contemplating the horror perpetrated on the Eugenio Casparini organ in Görlitz in 1926?

The Casparini project explores an organ-building tradition entirely different from the one that inspired GOArt's process reconstruction of an organ by Arp Schnitger in Göteborg.[12] It is also unique within EROI, being the only one of the three projects at Rochester that will result in a completely new instrument. But the aim of the project is really to create a new artifact from a previous era, in the hope that the research organ will be as good a teacher about the aesthetics of the late Baroque as the original instrument was when it was new. Why do this? Is it even possible? John Watson, Colonial Williamsburg's conservator of instruments and mechanical arts, has recently argued for coining the new term *restorative conservation* to describe a method of working with the complex issues of how to both preserve and continue to use and enjoy historical objects.[13] He has explained that the goal of *restoration* is to return the object to its original function; this goal serves the original conception behind the construction of the object. The goal of *conservation* is to preserve as much of the object's original substance as possible: it serves the physical material left over from the expression of the original idea, and the history of everything that has happened to that material since. These seem to be mutually exclusive goals, but Watson argues convincingly that *restorative conservation* can indeed occur. By replacing the minimum amount of historical material, and respecting that this material bears traces of information about the object's construction and its subsequent history, the best possible balance can be struck between changing the historical material in order to return the object to functionality, and documenting and preserving the history of the object for future researchers.

Watson's methodology helps to clarify what GOArt attempts to do with research building. A new object can be built in the spirit of restorative conservation, where not only the original idea is taken as a prime motive for the work, but as much as possible of the history preserved in the materials of the original is taken into consideration during the building; in addition, the work itself is carried out as carefully as if those doing the work were restoring an antique. Restorative conservation of an object such as the original Casparini

[12] See *The North German Organ Research Project*, ed. Joel Speerstra (Gothenburg University: GOArt, 2003).

[13] John Watson, "Restorative Conservation." (Keynote address given at the conference *New Dimensions in Organ Documentation and Conservation* [see n.11]).

organ in Vilnius can also benefit greatly from information gained in a process reconstruction of the original. In this case it is possible to recreate experimentally Casparini's working processes using new materials, and to compare the results to the original without doing any further damage to the original material; thus, afterwards, a judicious program of restorative conservation informed by the copying process can be carried out on the irreplaceable original material. The Rochester project has already led to knowledge about how the original instrument was painted, and how to reconstruct the original instrument's manual and pedal keyboards, as well as their relationship to one another at the organ console. Many details for a comprehensive plan for the restoration of the pipework will also be informed by the reconstruction.

Reading and Reconstructing Patterns of Work

The architectural philosopher Christopher Alexander has proposed that we feel more alive and engaged when we are surrounded by buildings that are created from what he calls a living pattern language.[14] A living pattern language is one that is shared by a community. Everybody is empowered to make a new object in this language because everybody already knows the vocabulary: we improvise in a living language of shared patterns when we speak to each other, or when we compose sentences on the page. Alexander suggests that historical building traditions took the same improvisational approach to shared communal patterns, producing landscapes of artifacts that share the same underlying patterns without looking like exact replicas of one another. Farmers, for instance, with no architectural training, can build their own barns that are clearly "a member of this family of barns, similar to hundreds of other barns, yet nevertheless unique" because they know the patterns of work underlying the design:

> Obviously the farmer does have some sort of image of a barn in his mind, when he starts to make a new barn, but not an image like a drawing or a blueprint or a photograph. It is a system of patterns which functions like a language. And the farmer is able to make a new barn unlike the ones which he has seen before, by taking all the patterns which he knows, for barns, and combining them in a new way.[15]

Like Alexander's farmers, historical organ builders knew how an organ looked and sounded, because they knew the patterns in the language that

[14] Christopher Alexander, *The Timeless Way of Building* (Oxford: Oxford University Press, 1979).

[15] Ibid., 175-79.

made up all of the things that it would have to do. Most of them did not make detailed architectural drawings; it is doubtful whether the majority of them made any drawings at all. Some made artistic pen and ink sketches merely to sell the church a vision of what they were thinking of building; indeed, it is evident that the drawings most often did not match the finished instruments.

The historical instruments themselves can be read just like any other primary source, a book, a visual image, a score, or a manuscript. Because historical organs are objects of such complexity, and demand so many traditional skills, they are concentrated laboratories for studying the tacit knowledge of handcraft from many periods. An organ can be seen as the product of repeated gestures frozen in time: with careful reading of the surfaces of an instrument it may be possible to hypothesize about the kind of gesture, its speed and direction, and possibly even the tool that was used. In some cases the tool itself can also be reconstructed. These reconstructed ways of working must be understood, copied, tried out, and finally performed, in a dialectical interplay between theory and practice. The historical practice of skilled craftspeople is simply a series of repeating actions, while the creative mind constantly analyzes the results and tries to fine-tune the skills, but these processes are both created and delimited by the simple tools that are used. Thus, these tools and the gestures made with them go a long way in determining the pattern language for a particular school of instrument building. However, the tacit knowledge of a handcraft tradition often lies in the living databank of skill that develops through this process. When the tools stop being used, the skills cannot be transmitted effectively in any other medium and the knowledge disappears. As methods of organ-building were modernized in the first half of the twentieth century, a large living databank of tacit knowledge, that had been built up over hundreds of years, was lost.

Though the gestures may be read and the tools reconstructed, however, people with the physical skills to perform the gestures are still needed. These skills are not easily acquired. The guild tradition seems to have prized a long period of apprenticeship; for a decade or more, many artisan journeymen learned by copying a master's movements and through this copying gained the tacit knowledge to make objects of supreme quality. Is it possible to copy enough to become actively involved in a pattern language that has ceased to be used by its original community? If it is, then we would automatically stop copying artifacts and start building in the pattern language we have learned. Only then is the quality of the reconstructed objects generated in the *same* manner as the quality of the historical objects we prize so highly. This is another essential difference between style copies using modern building methods, and research building that produces new objects using old working processes. One may judge the success of a process reconstruction by organizing an independent study of it as if it were a historical instrument to see if the same kinds of information about repetitive work gestures and the tools used can be read from the reconstruction as from the original.

Working by Consensus with a Reference Group

The Casparini Project has been a unique undertaking. One of its most unusual, most gratifying and most helpful aspects—in terms of generating documentation, discussion and the broadest possible perspectives in our understanding of the original model—has been the continual presence of a large and active reference group. The reference group for this project was established at the outset and has met together at least twice a year since 2003. It includes five leading North American organ builders, Paul Fritts, Martin Pasi, Bruce Fowkes, Steve Dieck, and George Taylor, joined by Munetaka Yokota and Mats Arvidsson along with the rest of the GOArt team from Sweden, including myself, Johan Norrback, and Paul Peeters as well as the Music Director of Christ Church Stephen Kennedy, and the three organ professors from the Eastman School, David Higgs, William Porter and Hans Davidsson, and Eastman's Professor Emerita of Musicology Kerala Snyder. This gang of fifteen has discussed every decision of the design and construction, in the first years of the project traveling together on research trips in Lithuania, Sweden and Denmark to study and discuss the original model and other instruments from relevant northern European organ traditions. Later, as designs were completed and construction begun, the group also functioned as a consensus-making decision body and a way of generating feedback on how the construction was progressing. The reference group has consistently urged the project to stay on track in using traditional methods and materials and staying as close as possible to the original model. There were, however, some clear exceptions to this rule. For example, the reference group decided to expand the compass of the manuals to d^3 and the pedal to d^1, in light of the fact that the benefits to repertoire playing for the coming generations of students at Eastman outweighed the small change to the design that involved adding two notes to the windchests, considering the ample room within the case. Another longer discussion involved adding a pedal coupler to the main manual. The coupler was not unknown to Casparini, and this decision was judged not to affect the integrity of the instrument as a reflection of the original—if you want to know how the original pedal division works, you don't have to use the coupler—while providing wider resources for repertoire playing.

Old and New Working Methods under One Roof

The Casparini organ was built using modern machines wherever they were deemed to save time without compromising the result, according to the maxim that anything that made the project more expensive without actually adding value to the final object was simply fetishizing the process of historical reconstruction (no wigs were worn, and far too little beer was consumed). However, the entire case has been hand-planed to preserve any acoustical properties of the original surfaces. The case was assembled using only bolts and wooden plugs. A policy for gluing was set at the beginning of the project and followed consistently: any piece of material, such as the bottom frame, that needed to be glued up from smaller pieces could be glued using modern glue and clamping, since pieces of these large dimensions are simply much harder for us to find now. Further, any gluing operation that was carried out on the original was also carried out in the same way on the reconstruction, using primarily hot hide glue. All of the pipe metal was also cast to as near final thickness as possible. The casting process was tried out both on linen-covered stone benches and also on a wooden bench reconstructed according to Dom Bedos's organ-building manual: both processes were tested because there was no way to prove which method Casparini used.[16] The use of minimal insulation under the linen cloth in both cases led to similar results in both cooling rate and hardness. All of the cast metal was scraped to final thickness by hand, using traditional planes.

Case and Windchest Reconstruction

The organ case is made almost entirely of pine, and represents a construction different from that of the typical north German Baroque organ. A small forest of twenty-four timber posts, roughly six by ten inches, and between twenty and thirty feet long, all manufactured from single trees, were bolted upright to the bottom frame. Then the impost molding and several stabilizing horizontal pieces at the level of the second manual were all bolted directly to the posts, and finally, the five large crown moldings were bolted to the vertical beams' tops, creating a simple grid pattern and a stable but open structure. During the installation in Rochester, this process only took four people about two days. No scaffolding at all was necessary to raise the posts and install the impost molding.

[16] Dom Bedos de Celles, *L'art du facteur d'orgues* II/III (1776-78), facsimile edition by Christhard Mahrenholz (Basel: Bärenreiter, 1965), 325 and plate 66.

Figure 5 *Raising the left pedal tower in Rochester. Photo: GOArt archive.*

It would probably have gone even faster and required minimum scaffolding if the pieces of the tower moldings had been manufactured on site and installed one side at a time, and then the moldings had been built up directly onto the frame pieces, as was probably done originally in Vilnius. We completed the tower moldings in our workshop, delivered them to the worksite and enjoyed

the hair-raising experience of lifting them thirty feet above the organ balcony, placing them onto the tops of the posts and bolting them in place in one go, an experience we would not have traded for anything, and perhaps will also try never to repeat! (See figure 5.)

Every opening in the resulting grid of the organ case is either closed with a panel, stabilized further with a cross-brace covered in moldings, hung with a door, or left open for a flat of pipes in the façade. Harald Vogel pointed out last fall that one result of this construction is radically different from the north German organ cases: the Casparini organ has one giant back wall, approximately six hundred square feet, made up entirely of thin resonant panels suspended from vertical posts. Whether these will work more like a large soundboard than like a reflector remains to be seen. The interior construction is relatively open within the thirty-foot-wide case so that blending from pedal division to manual divisions will develop differently compared to north German constructions. Another important question is how the location of the pedal division windchests, at least six feet below the level of the impost molding, may also contribute to a darker and graver sound (see figure 6). These factors, combined with the relatively dark pedal disposition, will surely produce a distinctive sound that is aesthetically somewhere on a journey from the high Baroque to the Romantic era.

The Organ Case as Aesthetic Manifesto

The case of the Rochester organ can be seen as a fairly radical aesthetic statement. The reference group for this project carried out a long and fruitful discussion about the aesthetics of surfaces on new organs in the United States, how far one can go in building in old styles, and how people generally might react if we dare to build a new organ that is going to act, look and feel almost immediately like an antique one. A crack on the surface of a new organ case is seen as a genuine problem! It interrupts the smooth, perfect surface and can easily be read within our modern aesthetic as a flaw. And yet a crack on the original case in Vilnius is experienced as a point of beauty unashamedly bearing witness to the use of traditional materials and allowing them to do what they will do naturally. The original was constructed using beams that cracked naturally here and there, and the original paint can be seen deep in these cracks, proving that they happened before or during construction and were simply allowed to be there with a minimum of coverage. In the reconstruction, the moldings of the impost and crown were also built from layers of vertical and horizontal pieces, and

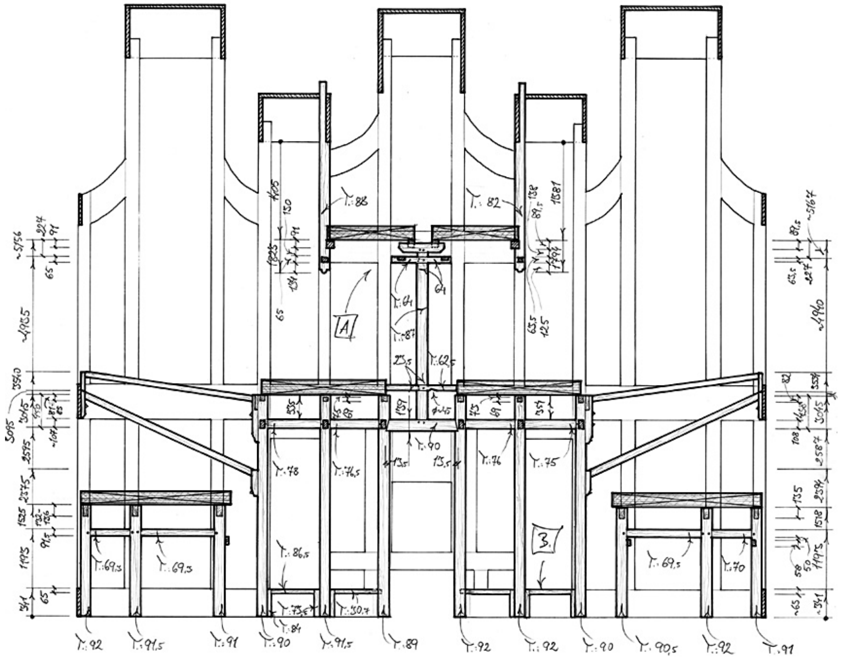

***Figure 6** Drawing by Niclas Fredriksson showing the positions of the six windchests in relation to the organ case structure.*

bent moldings, as in the original, that almost guarantee that some dark gaps will remain or soon quickly develop; but because these gaps create a general pattern over the whole surface of the case, they function in a very different way from a single crack in a modern painted surface. They function visually as a natural pattern outlining some of the underlying structural pieces behind the painted surface and allowing the construction to be read by the eye in a different way than if the surfaces were solid and smooth planes. The three-inch pine floor of the new balcony was also left untreated. It will wear just like old balconies do and will not draw attention to itself at the expense of the organ.

The painting of the case was crucial for the visual aesthetic to be experienced as genuinely natural, approachable and warm. We have been very lucky to be able to work with a team of painting experts from Germany, led by Monika May, who also expertly restored the organ case of the Italian Baroque organ in Rochester. Layers of gesso followed by color in thin layers of egg tempera were applied to build up the complex and deep ivory of the original, along with polyment gilding of the moldings and carvings. All of the gilding was

burnished in the traditional way with bone burnishing tools by an army of volunteers from the community who worked around the clock to help finish the task. The naturalness and broad variation of these materials work hand-in-hand with the aesthetic of the case construction. The burnishing leaves a high shine on the gold but also affects the surface underneath, leaving behind the traces of work by human hands. Some of these small imperfections catch the light from a different direction than the surrounding surface and help, as in any effective artistic creation, to draw the eye onward and keep the attention flowing over the surface. The hand-forged iron hinges and locks have simply been painted over as the eighteenth-century painters would do, rather than left on sharp display as might be demanded of our modern aesthetic; thus they make their presence known modestly on the façade in form and simple shadow, and are left unpainted inside the case and in the walkways through it, in order to heighten the experience of visiting the façade "on stage" and getting to look "behind the scenes."

Adjustments for Rochester's Climate

The interior of Christ Church in Rochester can swing from 9% humidity in January to 90% in July. The Holy Ghost Church in Vilnius, although in quite a harsh climate itself compared to many parts of Europe, was never heated, and its thick stone walls protect it from quick, radical cycles of temperature and humidity change. Clearly some compromises were needed if the organ technology designed for the Baltic Sea were going to survive on the coast of Lake Ontario. One primary concern was how the windchest construction would react; many modern builders in the States have not built windchests according to traditional Baroque European methods and materials because the climate is simply too harsh. Our goal was to stay as close to the methods and materials of the original model while providing a margin of safety for the climate conditions. Extensive humidity tests were carried out on the first windchest built for the project; these results allowed us to calculate how much the windchest was going to move in Christ Church over a cycle of seasons, and instead of altering the original construction methods and materials, we introduced enough places for expansion and contraction to compensate for the movement. There are several gaps between blind channel walls built into the frame to allow for large-scale expansion and contraction and, in addition, many of the channel walls themselves have been sawn in half and glued back together with a layer of leather in between, providing small-scale expansion joints (see figure 7). A high-volume, low-speed air circulation system is also being prepared to help control the temperature and humidity in the immediate area around the organ, and provide additional protection.

Opening a Window on the Enlightenment

What will the Craighead-Saunders organ tell us about the performance of music by J. S. Bach? Casparini apprenticed with Trost, as mentioned above, who created instruments for J. S. Bach's region of central Germany. How much is Casparini a child of the late eighteenth century, and what new perspectives will we learn about the music of Bach's students or of the transition from mid- to late-eighteenth-century sound aesthetics? One of the primary motivations for making research copies of historical instruments is to create new tools for the study of performance practice. Despite the fact that so much historical material exists in the original instrument, the reconstruction may in fact generate valuable perspectives about how the original instrument behaved when it was new. The instrument in Vilnius went through minor rebuilding and modernizing in the nineteenth century in order to bring it into conformity with contemporary taste. For one, the instrument was tuned down a half-step to modern pitch; luckily this was achieved by simply re-hanging the trackers on the keyboards one note to the right. This was easily reversible. However, many of the pipes of the original instrument were also heavily nicked in the nineteenth century, probably to reduce their Baroque speech and make them more suitable for Romantic music, and this is much more difficult to reverse without destroying further historical material. Thus, the speech characteristics of the research instrument may be closer to the eighteenth-century ideal than the evolved state of the original instrument when it is restored.

Reconstructing the original intonation of the pipework lies somewhere between an art and a science. From our experience of reconstructing pipework building methods from the north German Baroque in two previous projects, it is clear that the most important parameters of Baroque pipe voicing are already set by the design and careful construction of the pipes. The voicer's work may well have been limited to solving problems with specific pipes and allowing the rest to work as naturally as possible according to their design. Later voicing methods starting in the nineteenth century were much more invasive in order to remove all traces of the pipes' initial speech; for example, Cavaillé-Coll seems to have nicked pipes systematically as part of their construction even before they were voiced. Mid-twentieth-century neo-Baroque pipe voicing

Figure 7 *A close-up of one of the Rochester windchests, showing the built-in expansion spaces to compensate for changes in humidity. Photo: GOArt archive.*

was often more invasive for different reasons. First, the prevailing aesthetic demanded that a rank of pipes spoke with a single vowel color through the whole compass, unlike the constantly changing vowel colors of well-preserved Baroque pipework. Secondly, modern construction methods often produced pipes that did not always naturally sound when built, and needed more physical work by the voicer to get the pipes to speak and then to impose this single-vowel aesthetic. The most important parameter guiding the voicing currently being carried out by Munetaka Yokota on the Craighead-Saunders Organ is a healthy respect for the original design and construction methods of Casparini's pipework, and an attempt to resist imposing too much of our own will on the pipes. Recordings taken presently at regular intervals in Rochester are documenting the maturation of the voicing.

Research Building and Heritage Preservation

In addition to providing insights for modern instrument builders, students of the organ, and cultural historians, a process reconstruction can function as an important strategy for cultural heritage preservation. For one, the process reconstruction may reduce political and social pressure around risky questions of restoration. If there is a way to experiment with and experience the organ in its "original" state through the process reconstruction (with all of the obvious reservations about how close one can really come to the original, and a healthy hope that future generations will continue this work and learn to do it better) the original organ can be returned to a more recent playable state. This preserves more of its historical material while obscuring as little as possible of the record of the changes to which that material has been subjected. Watson's theory of restorative conservation offers a touchstone for restorations everywhere but also a guide for further developing research building and integrating it into restorations of all kinds.

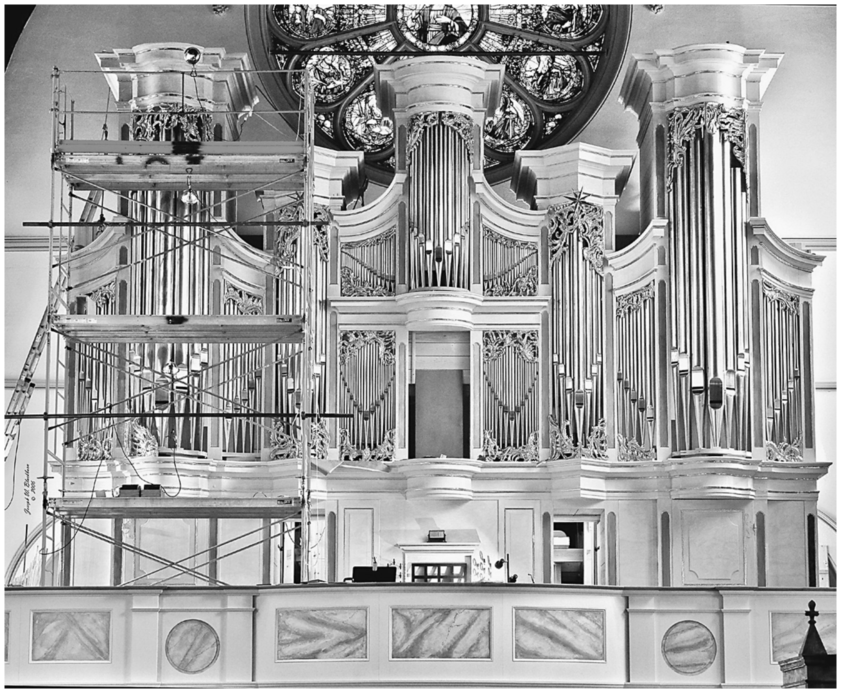

Figure 8 *The Craighead-Saunders organ being installed in Christ Church, Rochester. Photo: GOArt archive.*

A brief version of this article entitled "The Casparini Research Project: A New Organ for the Eastman School of Music," is forthcoming in *BIOS Journal* vol. 32 (2008), ed. David Knight.

APPENDIX I

Specification of the Vilnius, Holy Ghost Church Organ (1776), and of the Craighead-Saunders Organ, Christ Church, Rochester (2008)

31/II+P BY ADAM GOTTLOB CASPARINI

32/II+P BY GOART (see figure 8)

CLAVIATURA PRIMA
BOURDUN. á 16
PRINCIPAL. á 8
HOHLFLAUT. á 8
QVINTATHON. á 8
Octava Principal. á 4
Flaut Travers. á 4
Super Octava. á 2
Flasch Flöt. á 2
Qvinta. á 5
Tertia. á 1 3/5
Mixtura. á 5. Choris
Trompet. á 8

Claviatura Secunda
PRINCIPAL. á 4
IULA. á 8
Principal Amalel. á 8
Unda Maris. á 8
Flaut Major. á 8
Flaut Minor. á 4
Spiel Flöt. á 4
Octava. á 2
Wald Flöt. á 2
Mixtura. á 4. Choris
Vox Humana. á 8*
Dulcian. á 16**

PEDAL
Principal Bass. á 16
Violon Bass. á 16
Full Bass. á 12
Octava Bass. á 8
Flaut & Quint Bass. á 8
Super Octava Bass. á 4***
Posaun Bass. á 16
Trompet Bass. á 8

Accessories
Ventil ad Claviaturam Primam
Ventil ad Claviaturam Secundum
Ventil Pedall
Tremulants
BEBNY (Drum)
Vox Campanarum (Glockenspiel)
Gwiazdy (Cymbelstern)
Kalilujactgo (Calcant)
Shove Coupler (Claviatura Secunda to Claviatura Prima)

** Reconstructed on the original.*
*** This position was never occupied on the original windchest. There is no information preserved about the type and pitch of the reed stop once planned for this position. The research instrument has a 16' Dulcian.*
****Originally metal, now lost but reconstructed in both the original and the research instrument.*

Spellings and capitalizations are all according to the original stop labels and the order is given according to the use of these capitalizations. A Second Tremulant and a Pedal Coupler (Claviatura Prima to Pedal) were added to the research instrument.
Original Compass: Manuals: C-c^3; Pedal: C-c^1.
Research Instrument Compass: Manuals: C-d^3; Pedal: C-d^1.