

# Reassembling Guarini

**Mark Ericson**  
Woodbury University

Contemporary digital practice consistently engages the themes of rationalization and material adaptation. Complex forms are constructed in digital environments and rationalized through a number of processes that allow double-curved surfaces to be measured and built from flat materials. While these processes are powered by digital computation, their presence in architecture is by no means new. Stereotomy, the discipline of producing precise drawings for the cutting of stone developed drawing methodologies to deal both with the rationalization of complex forms and the adaptation of specific materials. This project reconstructs the drawings of the Italian architect Guarino Guarini (1624-1683) and demonstrates the means by which he adapted stereotomic methods and Euclidian propositions to respond to specific architectural conditions. It positions contemporary digital practices not as novel, but rather as outgrowths of centuries old architectural methods and discourses.

Guarini's posthumously published treatise, *Architettura civile* (1737), is broken down into a series of sections referred to as tractates. Tractate four, entitled "Ortografia Gettata", focuses entirely on the production of orthographic drawings for the design and construction of vaults. While this tractate has been referred to in a number of texts, and is often cited as an example of using orthographic projection to engender more complex forms from less, the specific methods by which he worked have not been examined in detail. This is in part due to the format of "Ortografia Gettata" which resists methodological interpretation. The projective relationships between drawings have been dismantled, seemingly to accommodate the requirements of page layout. This simple action removed the methodological evidence from the drawings that accompany the text; making Guarini's process nearly opaque. This project reconstructed and completed the drawings described in "Ortografia Gettata" so that all of the underlying methodological details could be understood (Fig1-4). The drawings do not simply repeat Guarini, but rather modify and extend his methods to both understand their mechanics as well as speculate on their contemporary resonance.

## REASSEMBLING GUARINI

Contemporary digital practice consistently engages the theme of rationalization and material adaptation. Complex forms are constructed in digital environments and rationalized through a number of processes that allow double-curved surfaces to be measured and built from flat materials. While these processes are powered by digital computation, their presence in architecture is by no means new. Sixteenth-century, the discipline of producing precise drawings for the cutting of stone developed drawing methodologies to deal both with the rationalization of complex forms and the adaptation of specific materials. This project reconstructs the drawings of the Italian architect Guarino Guarini (1624-1682) and demonstrates the means by which he adapted geometric methods and Euclidean propositions to respond to specific architectural conditions. It positions contemporary digital practices not as novel, but rather as outgrowths of centuries-old architectural methods and discourses.

Guarini's posthumously published treatise, *Architettura civile* (1737), is broken down into a series of sections referred to as *trattati*. *Trattato Iste*, entitled "Omnigraphia Geometrica," focuses entirely on the production of orthographic drawings for the design and construction of vaults. While this treatise has been referred to in a number of texts, and is often cited as an example of using orthographic projection to engender more complex forms from less, the specific methods by which he worked have not been examined in detail. This is in part due to the format of "Omnigraphia Geometrica" which resists methodological interpretation. The projective relationships between drawings have been dismantled, seemingly to accommodate the requirements of page layout. This simple action removed the methodological evidence from the drawings that accompany the text, making Guarini's process nearly opaque. This project reconstructed and completed the drawings described in "Omnigraphia Geometrica" so that all of the underlying methodological details could be understood (Fig. 4). The drawings do not simply repeat Guarini, but rather modify and extend his methods to both understand their mechanics as well as speculate on their contemporary resonance.

In the last section of "Omnigraphia Geometrica" Guarini delves into the development of spherical, elliptical and torus-like vaults. All of which are double-curved surfaces. Double-curved surfaces need to be rationalized in order to be constructed. Our contemporary use of projection and array of choices often grouped under the title of *unifoliation*. The practice begins with a complex form and reduces it to developable (planar) figures. Guarini did not have this option. Guarini's drawing of a vaulted vault does not begin with constructing a form and then subdividing it. Instead two geometric properties of the form are used to organize thirty-two intersecting cones that result in the geometric approximation of a vault (Fig. 1-3). Geometric approximation for Guarini is generative, not analytical.

The second issue that emerges from the section on spherical vaults is material. Guarini was an architect and not a mason. This meant that while the final intended use of his drawings was for the cutting of stone, he needed an intermediary step in order to "test" the results of his work. He makes specific reference to this early in this section. In the description of the process, he distinguishes between two kinds of drawings. There are drawings that are created for the "drawing" of spheres in paper (model building), but an entirely different kind of drawing is required for the "cutting" of spheres from stone. Guarini's method for the construction of the spheres contains both overlapping forms of drawing (Fig. 3). Guarini's drawings did not treat all material equally. Instead they developed specific drawing methods based on the properties of a given material. While contemporary practice continues to foreground the novelty of emerging instrumental practices, it often overlooks architecture's long-standing relationships with instruments and adaptive methodologies. This project seeks to develop representational methodologies not only through an engagement with contemporary instrumentality, but also through the study and adaptation of historic processes. Guarini's work provides a clear example of a 17th-century practice that both engaged in and diverged from our contemporary interests in rationalization and material adaptation.

1. Guarino Guarini, *Architettura Civile* (Turin: G. Maresco, 1737/202).

FIGURE 1: Layer 14, Treatise 1, Figure 9

FIGURE 2: Layer 14, Treatise 1, Figure 5, Model

FIGURE 3: Layer 13, Treatise 1, Figure 1-3

FIGURE 4: Layer 14, Treatise 1, Figure 1, Overlay and Model