The Dome of Santa Maria del Fiore by Brunelleschi, c. 1420-1436, Florence

*Photos courtesy Adrielle Kent (web sources)*
In the early 1420’s, Filippo Brunelleschi (1377-1446) began one of the most ambitious architectural feats ever attempted. His task was to construct a dome to crown Santa Maria del Fiore, the primary cathedral in Florence. Brunelleschi was able to provide a comprehensive solution to the complex engineering problems involved in building a round dome of that magnitude. His ingenuous design made it possible for him to build the highest dome up to that time and the largest since Hadrian’s Pantheon in Rome. Giorgio Vasari (1511-1574) stated about the architect, “[Brunelleschi is] like Giotto, meager in person but of a genius so lofty that many say he was given to us by Heaven to reform architecture that has been for many centuries deformed…” (qtd. in Jackson, p. 27). The dome spurred the trend of Renaissance architecture and many other structures in Europe and other areas of the Western hemisphere were inspired by it. The vision for this wonder of architecture came not only from Brunelleschi’s mind, but from the culture in which he lived. It would have been a simple task to build a sturdy covering for the cathedral, but it was imperative that it be dome-shaped. The reasons for this geometrical choice are many and the history of geometry in art and architecture goes back thousands of years. The explanation of why the spherical shape is important in western culture provides an understanding of what is valuable to the western esthetic. There are several reasons why domes are so important in western architecture. The reasons for this structural choice that is present in so much western architecture is not merely practical; it is ideological. These ideologies illuminate numerous characteristics of western society and thought from antiquity to the present day.

Brunelleschi

Brunelleschi’s father, a notary and counselor for the city of Florence, was on the committee of 1367 charged with planning the dome, so Brunelleschi grew up with the unfinished cathedral, which may have inspired him. Little is known about his early life, but it is documented that he became a goldsmith after his father’s unsuccessful attempt to make him a notary (Jackson, p. 27). He became a member of the Goldsmith’s Guild in 1401 (Hughes and Lynton, p. 16). A crucial moment in his career came when he participated in a contest to create a set of metal doors in relief sculpture for the baptistery of Santa Maria del Fiore. The Opera of the Baptistry announced a contest for the commission for a set of doors for the structure in 1401. The commission came shortly after an outbreak of the Black Death in Florence and may have been considered a public act of piety (King, p. 15-17).

Out of the several Florentine artists who participated in the competition, his most formidable opponent was another artist by the name of Lorenzo Ghiberti, another goldsmith. It has been suggested by some art historians that Brunelleschi’s panel does not posses the sense of balance and harmony that he achieved later in his architecture. It also required more metal to build than Ghiberti’s simple and elegant panel. Ghiberti used classical models to construct a more muted design may have been more appealing to the judges.

There are two stories that tell who won the contest for the doors. One states that Ghiberti and Brunelleschi both won, but Brunelleschi refused to work with Ghiberti. Another says that Ghiberti won and the
disgruntled Brunelleschi left the city. Regardless of what the precise conditions were, it is clear that Ghiberti was granted the commission for the baptistery doors and Brunelleschi left for Rome shortly after the contest was over. While in Rome, Brunelleschi spent years studying ancient Roman ruins, collecting samples, and drawing. Brunelleschi worked as a clockmaker as a means of support while he stayed there (King, p. 20). Sculptor Donatello accompanied him on one of his visits to Rome (Hughes and Lynton, p.16-17). “As pioneers in this work, it is remarkable how much they were able to assimilate of the character of ancient buildings,” state Hughes and Lynton (p. 17). Although keen observers, including Brunelleschi, clearly mistook some early Christian buildings for Roman models, Brunelleschi did study several authentic Roman monuments. One such structure was the Pantheon, a Roman domed structure attributed to the emperor Hadrian (120-124 AD). The architect claimed that he would be able to build a dome larger than the one on the Roman masterpiece. His later work has Roman elements, but the structures are reinterpreted according to Renaissance aesthetics. Mathematical knowledge was very important for the artist in order to replicate Classical building techniques. The field fascinated Brunelleschi; one of his companions during his excavation in Rome was mathematician Paolo Toscanelli (1397-1482) (Hughes and Lynton, p. 17). By 1420, Brunelleschi would use his newly acquired knowledge of ancient building techniques in Florence to achieve a major breakthrough in architecture. 

**History and Details of the Dome**

Architect Arnolfo Lapi built the base of the dome, but did not live long enough to finish the dome itself. The competition to design the dome for Santa Maria del Fiore was announced on August 19th, 1418. The Opera del Duomo, the committee responsible for building the dome, released the following public statement: “You must erect a monument which human art could not conceive more noble or more beautiful. You must build it in such a way that it corresponds to the heart grown extraordinarily large and containing the souls of all citizens welded together into one single will” (Guntern). The winning prize consisted of two hundred florins, which would be considered a small fortune at the time. After going through a great deal of effort to convince the Opera del Duomo that his design for the cathedral would work, Brunelleschi was given the commission to build the dome. He used the architectural principles he learned in Rome to complete the massive project.

No dome had been built larger since the Pantheon, and Brunelleschi’s was the highest ever built. The Pantheon’s rotunda is 140 feet high and the diameter is 142 feet (Anderson and Speirs, p. 221). Brunelleschi’s dome on Santa Maria del Fiore reaches 157 feet high and is 143 feet in diameter. He was able to achieve such a large-scale yet incredibly stable work using innovative engineering methods and construction techniques.

Historians credit Brunelleschi with the invention of linear perspective, although other artists surely contributed to its development. Brunelleschi may have developed his version of the perspective system from the process of creating architectural drawings. Brunelleschi is known as a “paper architect,” meaning that he drew his designs on paper instead of using models, which were more popular at the time that he worked. In order to create an accurate drawing, the draftsman must know how to draw using a mathematical system. Brunelleschi developed his system of perspective during his time in Rome, while studying ancient architecture. He would have needed drawings to take back to Florence with him so he could reference the designs.

The Dome was begun in 1418, but Brunelleschi had already begun working on
the project before then. He served with Ghiberti on a committee in 1404 that required Giovanni d’Ambrogio, an architect who was working on the cathedral, to lower the semidomes. They remain at the designated place today. Brunelleschi needed the semidomes to be lowered so a drum could be inserted between the central dome and the semidomes surrounding it. The lowering of the semidomes reduced the amount of weight on them so this would be possible.

The octagonal dome for the base of the cathedral had already been built when Brunelleschi started working on the dome, which means this aspect of the structure was not part of his design. The floor plan of the cathedral was by Arnolfo di Cambio (1232-1302), who designed the octagonal crossing. The decision to make round oculi surrounding the dome instead of the pointed Gothic style was made in 1367.

The dome has eight ribs that correspond to the octagonal base of the structure. There is a buttress for each rib. Each buttress in turn is surmounted by a volute. Every angle contains a Corinthian pilaster. The arched windows rest on capitals designed by Brunelleschi. Each window opening contains a classical shell shape. The exterior surface décor possesses a sense of harmony and simplicity foreign to Gothic structures and reflects Brunelleschi’s rational architectural style.

Brunelleschi’s design made it possible to build the dome without centering, an architectural technique that uses wood frames to hold an arch in place during its construction. Scaffolding allowed masons to reach the increasing height of the dome to work on it. Masons used to have to carry materials up to the top of a building they were working on. Brunelleschi’s system included hoisting machines that carried the material for them. The Opera del Duomo had to official forbade Florentines from riding the machines for the fun of it (Hartt and Wilkins, p. 165).

Brunelleschi decided that the bricks should be placed in horizontal rings. Each section contains a vertically placed brick at certain intervals. The row on top of it contains another vertical brick that corresponds to the previous one, creating a whorl pattern that culminates on a keystone. This system forms a herringbone pattern that provides excellent stability. To reduce the weight of the dome, the lower levels of masonry are stone, while the upper layers are brick.

Perhaps the most innovative aspect of the dome’s design is Brunelleschi’s double-shelled system. There is an inner and outer dome that are each connected to the eight ribs. In between the two shells, sixteen smaller ribs are hidden by the exterior walls of the dome. They are only visible inside the staircase between the shells that can be used to reach the summit of the dome. The smaller ribs are connected with stone bands to each other and also to the primary eight ribs. Close to the base of the dome, the interlocking grid gains additional support from oak beams, connected by iron links.

Initially, the dome contained seventy-two oculi. The inner ones were covered in the 16th century so the ceiling could be frescoed, however the outer ones can still be seen. The Opera del Duomo considered lighting the interior with openings at the top, similar to the oculus of the Roman Pantheon, but the idea was scrapped in favor of a lantern.

Flying buttresses could have been used to support dome but did not appeal to Italian taste (Brown). The Italians did not want to look like French and English; an important aspect of building monuments in Europe was political competition. To build a dome with no buttressing was unprecedented at the time, which would have resulted in awe and respect for the Florentines. Architecture could be an indirect means of defense; if the Florentines could make a remarkable breakthrough in architecture, they could theoretically do the
same with weaponry. It would have been impossible to make the dome completely free-standing, so Brunelleschi cleverly hid the buttressing in the dome so it didn’t actually look like buttressing. The semi-cylindrical exedrae serve as buttresses that are cleverly blended into the architectural façade of the structure so the dome appears to stand without buttressing. The exedrae are distinctly not Gothic. They are based on Roman temples that Brunelleschi had studied. The structures are executed following ancient Roman proportional systems. Brunelleschi also inserted rectangular impost blocks that create more of a sense of verticality that counteracts the visual weight of the exedrae. With semi-domes surrounding the primary one, support for the structure was made possible in a most subtle way.

Brunelleschi’s most important architectural contribution was solving the engineering problems involved in building such a structure. Francesco Bocchi stated in the fifteenth century that, “In truth, knowledgeable artists cannot well decide whether this sovereign building is more beautiful or more strong, for joined together, those two things compete with each other for first place, and yet are at the same time in harmony in generating wonder and amazement” (qtd. in Hartt and Wilkins, p. 165). Florentines were marveled by Brunelleschi’s architectural achievement.

Some of the details on the exterior of the Dome were completed after Brunelleschi’s death. Architect Michelozzo di Bartolommeo was responsible for completing the dome. Michelozzo designed the attic, crowned by a fluted cone, gold orb, and cross. Other artists worked on the structure. Andrea del Verrocchio, Leonardo da Vinci’s teacher, created the gold orb in his workshop.

Although the dome looks spherical, it is not a perfect sphere. Its construction takes ideas from Gothic architecture, structurally resembling a Gothic vault more than the ideal hemisphere of the Pantheon that Brunelleschi had studied. The goal in this structure was clearly to make a spherical dome, at least one that appeared spherical. However, Brunelleschi had to work with the Gothic structure that was already present. The task of building a sphere on top of an octagon is not a simple one. Ian Sutton states, “Architecturally, the Renaissance is always taken to begin in 1418, with Brunelleschi’s dome of Florence cathedral” (p. 126). The author goes on to say that this is peculiar because Sutton claims that the dome owes more to Gothic architecture than Classical architecture (p. 126). A more accurate way of interpreting the some is realizing that the structure takes many Classical principles and harmoniously incorporates them into the previous Gothic design the cathedral already had. Brunelleschi was successful in seamlessly incorporating a new Renaissance style of architecture into a Gothic structure.

**Vasari**

Just as important as the architecture of the dome is that décor inside. Giorgio Vasari was primarily responsible for painting the fresco on the inside of the dome, which was rendered between 1472-79, although the work was finished by Frederico Zuccari. The fresco represents the Last Judgement, a common theme in Christian art. Perhaps more importantly, he depicts the Heavens. The spherical dome is a convincing background for representing the sky. It seems as if some figures in the painting are spiraling back into space and others are about to leap from the wall. The atmosphere is convincing, complete with clouds and shades of brilliant sunset colors.

Gorgio Vasari was the first known art historian. He compiled “The Lives of the Artists,” a work which includes the lives and work of such masters as Michelangelo, Leonardo da Vinci, and Filippo Brunelleschi. Although there is a great deal of legend as well as Vasari’s own opinions in the work, the
facts included in it are still helpful to art historians.

The artists who worked on the dome and cathedral it rests on were true Renaissance men (the construction was male-dominated). The contributing artists possessed more often than not a wide variety of skills, including painting, sculpture, architecture and structural engineering. Thus, the artists themselves embodied the pluralism inherent in the structural design of the dome. Its multiplicity of meanings is clearly enhanced by the broad range of perspectives brought to the project by the structure’s creators.

**Philosophical Context**

The concept of universal harmony as it was understood during the Renaissance originated with Pythagorean and Platonic proportional systems found in geometry, music, and ultimately, nature (Koenigsberger, p. 173). The ideas of many mathematicians and philosophers were used in Brunelleschi’s dome and Renaissance building techniques. “Several examples of conceptions of harmony in theories of art and architecture, and also in suppositions about nature and reality, have been brought forward [by scholars].” (Koenigsberger, p. 173). Notions of harmony and beauty are integral aspects of the architecture and art of this period.

One of the most important philosophical aspects of the dome is its shape. Although the dome is not a perfect sphere, it is intended to represent one. The spherical shape has many philosophical implications. The sphere is derived form the shape of a circle. The circle has been used to represent several key philosophical ideas in Renaissance culture. The origins of this philosophical context go back to the ancient Greeks, particularly the philosophy of Plato.

What is important about the philosophy of the circle is not any particular circular shape. It is the universal idea of the circle that is relevant. There are certain properties that all circles possess. The line that forms a circle continues indefinitely on its prescribed path, symbolizing eternity. Eternity is an important concept in Christianity, so the circle was an important icon in Medieval and Renaissance art. The circle is also associated with God and Heaven, which are eternal according to Christian thought.

Anthony Kenny conveys Plato’s Idea of the circle in a nutshell: “My subjective concept of the circle -- my understanding of what ‘circle’ means -- is not the same as the Idea of the circle, because the Idea is an objective reality that is not the property of any individual mind” (p. 50). This statement can be better understood by exploring Plato’s philosophy of Forms. According to Plato, everything in the physical world is a copy or shadow of a universal Idea. This world of universal Ideas or Forms is ideal and unchanging. The universals are Ideas themselves and the copies of the Ideas in the physical world are referred to as Particulars.

One way to approach this philosophy is via Plato’s cave analogy (cf. 521c-535a of Plato’s Republic). Plato presented his concept of education by describing a cave in which humans are chained to a wall and cannot move. In front of them is a fire that provides light. Objects in the outside world, which the imprisoned ones cannot see, are reflected as shadows on the wall in front of them, so they can only understand the physical objects outside of the cave as shadows. In the analogy, the real objects outside are the universal Forms, while the shadows of the objects visible inside of the cave are Particulars. So the world of Ideas is more real than the physical world for Plato, but humans are shackled to the physical world, unable to fully experience universal Forms.

Plato’s philosophy parallels the concept of Idealism. The world of Forms is ideal, from which everything in the physical world is a copy. So Plato espouses the idea that the Ideal does exist, but humans cannot fully
experience it. Plato’s philosophy was easily reconcilable with Christian thought during the Renaissance. For Renaissance thinkers, God is part of the ideal world, while humans inhabit the imperfect physical world.

Neo-Platonism became a popular philosophy during the Renaissance and embodied a resurgence of Platonic thinking. Renaissance philosophers reinterpreted the teachings of Plato according to their contemporary views. There is a distinction between Plato and the Platonic tradition (Kristeller, p. 50-51). Philosophical traditions transcend the initial philosopher and take on a life of their own, becoming cultural movements that evolve over time. Platonism and Neo-Platonism are no exceptions.

Renaissance philosophers emphasized tradition. They saw ancient philosopher’s ideas as authoritative, considering such philosophers as Plato and Aristotle to have possessed divine wisdom. During the Renaissance, it was generally believed that God is omnipotent and embodies all truth. The philosophies of the Renaissance presented a blend of tradition, religion, antique ideas, and new interpretations (Copenhaver and Schmitt, p. 1).

Humanism was a crucial phenomenon of culture in modern Europe and, along with secularism, was formed during the Renaissance. In Northern Italy, lay notaries and law teachers advocated early humanism in the 11th and 12th centuries. The first humanists were interested in reviving Classical culture and using it as a template for contemporary ways of living. They studied and taught Latin and Greek texts (Copenhaver and Schmitt, p. 25).

Representing the cosmos was the primary goal of Renaissance dome construction. “…Finding ourselves looking up is at the heart of our experience of sacred of sacred architecture” (Davis, p. 11). This way of representing the heavens was not invented in the Renaissance, however. For example, the Pantheon’s Dome clearly symbolizes the sky, but not in the same way as a Renaissance church would. The Roman vision of how a representation of the cosmos should look was perhaps similar, but certainly not the same, as the Renaissance one. Nevertheless, domes in Western culture do generally represent the sky. The heavenly realm can represent various ideas including God or heavenly beings, eternity, the universe, and even ideas themselves. It is natural for people to look up at the sky and imagine. Biologically, it is not clear why this is. The celestial bodies can be used for practical purposes, such as navigation. They also seem to spark the human imagination. The Heavens are a vital aspect of numerous philosophies and religions throughout history, and the dome is one important way the sky can be depicted in the Western esthetic.

Hegel

Not only was the design of the dome influenced by philosophies that were popular during the Renaissance; the dome of Santa Maria del Fiore and others like it have been the topic of philosophical discourse of later philosophers. The philosophies that have been formed after the dome’s construction speak to the structure’s importance to Western culture.

The aesthetic appeal of a dome has a background that many philosophers have explored. One such philosopher was the famous 19th Century German thinker Hegel. Hegel taught that “the Absolute is approached by art aesthetically, in the beauty of material forms” (Rohmann, p. 172). Hegel also taught that architecture should create a place of meaning for the inhabitant, realizing that a structure would always be influenced strongly by the culture in which it was built (Sharr, p. 105).

Hegel believed there are “three stages of architecture…organized around their relation
to function: symbolic architecture comes before any posited separation of function and mass, classical architecture achieved a perfect balance of the two, and romantic architecture goes beyond the dominance of function” (Kolb). Brunelleschi’s dome fits into Hegel’s second category. The architect was emulating classical models and successfully captured the essence of classical architecture. In his dome, symbolism and function are perfectly meshed. While it has an enormous amount of symbolism, it is also incredibly strong. Hegel also believed that function is an external aspect of architecture. The essence of architecture is its symbolic meaning. He also believes that there are three stages of art, which include the universal, the particular, and the individual. The universal is the idea behind the art itself, or why it is important. The particular is the art technique being used. For example, in a painting the particular is paint. The individual is the finished product, a painting on canvas, for example. This finished product should embody the universal, or the main idea of the work of art, even art itself.

In the case of Brunelleschi’s dome, the universal is complex, and is the focus of this discourse. It represents God, eternity, the firmament, rationalism, imagination, and idealism. The particular is the means that were used to construct it, which is architecture. The individual aspect of the dome is the finished product of the structure itself, which embodies the universal. So, through Hegel’s philosophical principles, a deep philosophical context for this structure can be deduced. Much philosophy has been done exploring art, what it is, and what it means. This work of architecture raises complex philosophical questions about the nature of art and perhaps nature itself. Art can be viewed as a visual philosophy that may have the capability of saying more than words can.

Heidegger

Heidegger was interested in Cartesian metaphysics, primarily exploring what the definition is of “what constitutes a thing around the universal concept of mathematical extension of space” (Walker). Architecture presents the current cultural idea of what is but it also presents a challenge to that status quo by visualizing how temporal the current notion of the universe is. Brunelleschi’s dome does this precisely. It embodies Renaissance religion and philosophies of the time, simultaneously creating a monument to the temporality of it all. We can see the structure and recognize the Renaissance ideas imbedded in it which have now become dated. At the same time however, there are elements of Brunelleschi’s dome that defy time and remain relevant to the modern age.

Conclusion

By reflecting on what these philosophers have said about Western architecture, one can see that certain architectural structures embody complex philosophical contexts that reveal the cultural ideas of the time in which they were made. Later philosophies that are formed about such structures speak to the culture of those philosophers and the continued cultural relevance of such architecture. Structures such as the Dome on Santa Maria del Fiore have a complex philosophical background and the ideas embodied in such architecture are ingrained in today’s culture in the West, making them relevant to contemporary culture beyond their mere historical value. Rationalism, reason, innovation, and individualism, among other ideas, are all embodied in Brunelleschi’s dome; as ideas, these influences continue to be central, and increasingly problematic, to contemporary Western culture. Might there be a link to the technological foundations of our own culture, and to the forces holding court on the construction of our own grand *duomo*?
References


