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When engineering is art: The meaningful value

Cuando la ingeniería es arte: el valor significativo

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Abstract

Nowadays, an approximation of the concepts of engineering and art is required, since they are nothing more than modes of expression with which the engineer, like the artist, becomes a maker of form. Beyond the materiality of bridges, dams, or buildings, the engineering work configures a product of sensibility that intellectually provokes the spectator in the same way that conceptual art does, so that the value of engineering must be adjectivized as significant. Just as one cannot claim that art that is recognized as commercial is not art because it has a market value; it is pure reductionism to deny that engineering and art share qualities, beyond its primary function. What both manifestations have in common is significant value, and this is what allows us to unify properties in an attempt to define what can be considered art.

Keywords: *Art, Engineering, meaningful value, Experience, Place*

Resumen

Actualmente se requiere una aproximación de los conceptos de ingeniería y arte, como modos de expresión con los que el ingeniero al igual que el artista se convierten en hacedores de la forma. Más allá de la materialidad de puentes, presas o edificios, la obra de ingeniería configura un producto de sensibilidad que provoca intelectualmente al espectador del mismo modo que lo hace el arte conceptual, por lo que el valor de la ingeniería se ha de adjetivar como significativo. Al igual que no se puede afirmar que el arte reconocido como comercial no es arte por tener un valor de mercado; es puro reduccionismo negar que la ingeniería y el arte comparten cualidades, más allá de su función primaria. Lo que tienen en común ambas manifestaciones es el valor significativo, y es lo que permite unificar propiedades en un intento de definición de lo que puede considerarse arte.

Palabras clave: Arte, Ingeniería, Valor significativo, Experiencia, Lugar

1. Introduction

Being able to define what art is, is in itself the question and the problem that is first addressed in works such as the present one. The range of answers that a reached, leads us to think about the need to reconsider whether it is correct to pose it that way. What seems to be consensus is that its meaning has not permeated society, although philosophy has focused to a greater or lesser extent on such a problem. It seems opportune to state that art, in continuous movement (Paz, 1989), does not specify that question, since right now it seems unfeasible to be able to answer it and previously it did not make sense when art followed exact rules, with objective parameters such as beauty, narration or technique; Currently, they have been dilapidated as evidenced by the multitude of recognized works of art that do not follow them. In this sense, it would be better to ask what works at each moment can reach the consideration of art or where there is; since the comparison between disciplines or paragone (Farago, 1992), and mainly the supremacy of painting over other arts, is repeated in each era. If centuries after the appearance of photography, he came to only place it as a philosophical limit case of works of art (Kennick, 1958), it seems correct to assert that new paragons, such as the case between art and engineering, have only just begun.

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Revista Ingeniería de Construcción. RIC
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It should be noted that this study is limited to the field of civil engineering and particularly to large constructions. There is no reductionism in the limitation to works that, together with their functionality, have an exempt character (Figure 1) in the field of life: bridges, dams, roofs... since the particularity of works such as highways or railways is also identified, which are beautiful in their extension as a form in itself in the space of the landscape, of light, of chromatism...and are examples of the value of engineering, which must be described as significant and how it proposes an equally significant experience.

Figure 1. *Hoover Dam in the US. Example of large exempt infrastructure*

The concept of exempt is important in terms of the large works studied, to limit the study to others such as sanitary, drainage... that also make up civil engineering. This aspect reflects the pyramidal nature of the disciplines in terms of excellence; as are single-family houses in architecture, certain musical styles, which do not reach aesthetic or artistic categories of value, for the mere fact of being framed in areas of art. Voices are emerging regarding the synergies between disciplines, such as those that lead to highlight the appropriation of engineering strategies from the conceptual art (Saisho Magazine, 2019), in which the ideas prevail over the material support (Figure 2).

Revista Ingeniería de Construcción. RIC
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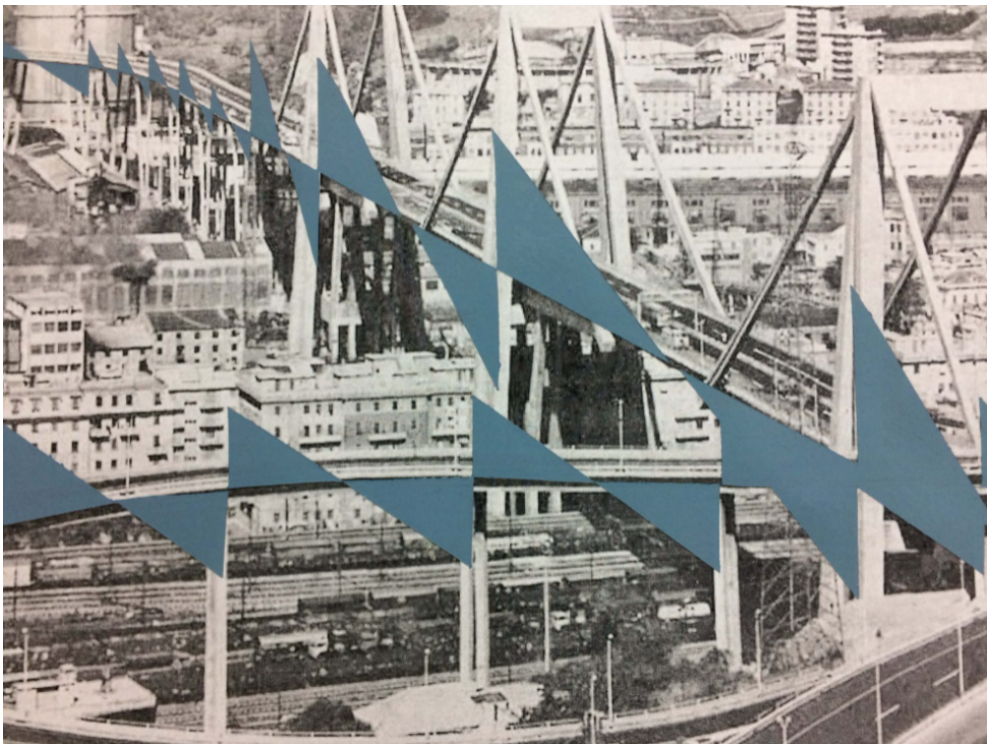

Figure 2. *Superimposition of the law of shear forces on a photograph of the collapsed Morandi Bridge in Genoa. (Source: https://saishoart.com)*

What seems to be accepted today is that the modern art system is something that has been shaped, as a recent European invention. Since for two thousand years art was utilitarian and what is now pointed to as the death of art would not be but the end of a certain social institution whose origin dates back to the eighteenth century (Shiner, 2004). In the eighteenth century aesthetics is discovered, art emerges as a field of superiority and symbolism (Tatarkiewicz, 1974) and therefore the idea of relating art to beauty and taste, but also to the spirit (Kant, 2014). We understand the spirit as the creative power of the artist, as artistic beauty above natural beauty, and as the depth of art above the outer surface of taste (Hegel, 1966). The foregoing lays the first theoretical basis that gives rise to the reflection that is sought in this work, about engineering and its significant value in art.

Likewise, different authors have spoken out against the autonomy of art, pointing to the need to lower it from the heights (Dewey, 1980). The concept of art as something elevated is still present today; At the same time that it is recognized as something remote from society and belonging to a select few, it is given the quality of something superior to the rest (Bourdieu, 1995). The autonomy of art was the response of artists to the domination to which they had been subjected by power for centuries (Rancière, 1998), although in parallel the industry and the work of art emerge as merchandise to which artists withdraw with the consequent pursuit of their interests (Adorno, 2015).

The foregoing entails the birth of the market value in art and economic value that can be evaluated. Works of art, as interchangeable consumer goods, acquire an economic meaning with a mercantile character that art wanted to oppose with the birth of the conceptual, whose intelligentsia cannot get rid of the merchandise: serve as an example of the possibility of selling a video of a performance.

It is necessary to define the concept of value in art, that beyond the sense of human work that would be easily associated with a commodity, the epistemological, intellectual, and symbolic value that surrounds artistic practice must be considered (Graw, 2010). Objectifying the market value of the artistic work is difficult due, among other aspects, to the originality status of each work. Faced with a perishable consumer good, the durability of the works of art that survive us contributes to reviving the status of authenticity, going from having "value for worship" to "value for the exhibition" in the second half of the century. XIX, with the rise of the aesthetic experience (Benjamin, 2003). In any case, and regardless of the foregoing, works of art currently respond to a demand, they are objects obtained in an ephemeral way for an aesthetic experience of the museum viewer, of merchandise for the museum itself or an investor, and, even to achieve social prestige (Veblen, 2007).

Its symbolic value refers to its cultural, humanistic, and intellectual nature beyond what is economically measurable (Bourdieu, 1995). It seems that it is in the supposed impossibility of economic quantification of the work of art where art finds its meaning and its symbolic value, its reason for being: "a work of art is not valuable, it has no

Revista Ingeniería de Construcción. RIC
Vol 37 Nº2 2022 www.ricuc.cl
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commercial value, it cannot be paid for with money" ((Flaubert and Sand, 1992) p. 458). It is therefore important to distinguish in the work of art its symbolic value, difficult to measure in economic terms, from its market value, which paradoxically is based on the previous one and therefore equally difficult to objectify (Rexach, 2005).

The approach to the question of what is art for or what is its value seems to have found an answer recently. Aesthetic ideas materialized during the 20th century to convey meaning (Figure 3). With the Historical Vanguards first and all the art of the end of the century, the question of what art is reveals itself a very different matter from what it was until then. It does not seem by chance that one of the artists who most contributed to eliminating intrinsic characteristics from the concept of art, such as Duchamp, dispensing with beauty for beauty's sake, of retinal art that only satisfies the eye, also spoke of bridges; on his way to delve into the art that he makes you think.

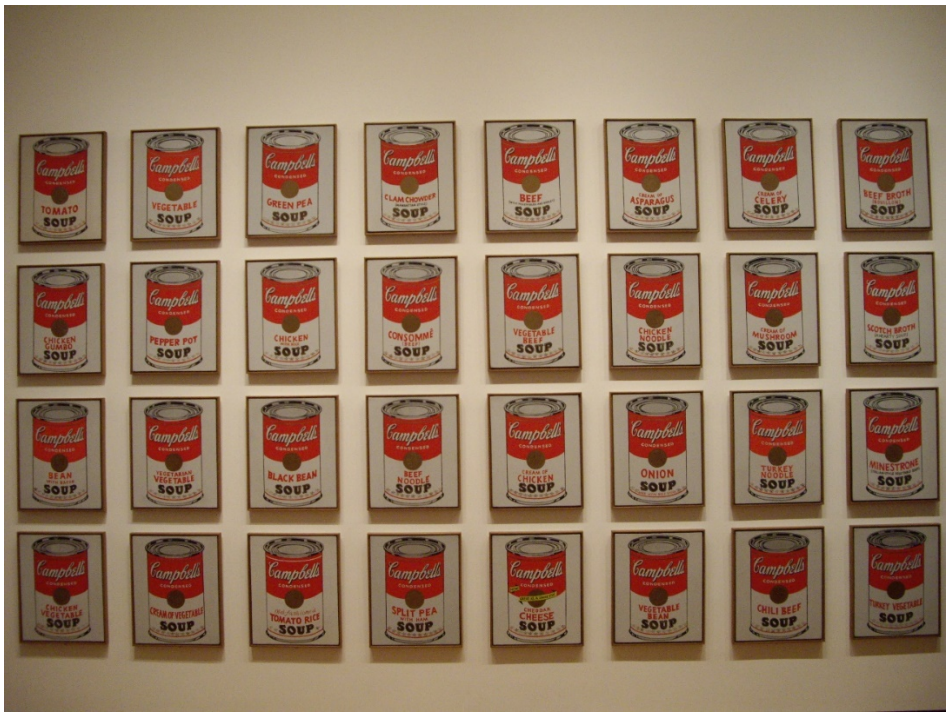

Figure 3. *Andy Warhol's "Campbell's Soup Cans" at MOMA in New York.*

The theory of conceptual art at the end of the 20th century strengthened the idea that a work of art cannot be understood as something isolated, encapsulated between what divides what is or is not art. From then on, the work of art has to be placed concerning to the historical, social, and economic conditions (Graw, 2014).
"The embodiment of ideas, I would say, of meanings, is perhaps all we need as a philosophical theory of what art is" ((Danto, 2013), p. 110).

Likewise, the concept of meaning has been associated with what is built, since we are the places we inhabit, in the interaction with space we fill the environment with meaning and build the universe of meanings in our mind (Corraliza, 2009). If Weber described people as spiders suspended in webs of meaning that they have woven over time (Schroeter, 1985) it seems opportune to emphasize the importance that what has been built, the network of engineering works, be studied from its meaning.

The approximation of the concepts of engineering and art has been claimed (Tarrés, 1999), since the engineer, like the artist, as the maker of the form, of bridges, dams, and buildings...configures a product of sensitivity that intellectually provokes the viewer, this being the true value of art, like any other artistic manifestation. To do this, it is important to focus on the fact that the key is to have a historical vision of both art and engineering, before and now. The pyramids of Egypt were then engineering works associated with the use, and today they are works of art like so many other cases to which time is added; or the navigable channels, which have gone from being transport systems to socio-cultural and environmental spaces.

It is therefore an objective of this study, more than giving answers, to locate what is common between disciplines currently not seen as close, and that art and engineering may belong to the same group. For this, it is necessary to find a property, such as meaning, which is common to all works of art and engineering. The solution has to approach the concept of meaning, beyond the intrinsic materiality or main use:

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(...) my intuition is the following: the work of art is a material object, some of whose properties belong to the meaning, and others do not. What the viewer must do is interpret the meaning-providing properties in such a way that they come to understand the expected meaning they embody ((Danto, 2013), p. 40).

In this study, the art-engineering binomial is proposed as the axis of a proposal that will try to expose the dimensions of the aesthetic value of the work of engineering and the theoretical problems promoted by, among other circumstances, the birth of the aesthetic discipline and the historical struggle for the autonomy of art. It starts from the conception of the art object as a symbolic asset, whose peculiarities also determine the current structure of the art market. Fixing the above allows raising a step to the engineering work in terms of significance, since, in the sense of the non-material and transferable, the engineering work would be even above conceptual art.

The problem in current art between actors and concepts such as market, autonomy, and idealization, means that the work of engineering may not be considered art for the mere fact of not being salable, considering the meaning of the work of art as merchandise.

On the other hand, pointing out that contemporary art has moved away from the reductionism of aesthetics and champions the power of meaning and the possibility of being, in the interpretation of the work of engineering, in its ability to tell what it is about, what it means; he finds this work the demonstration of his objective. It must be considered that if art and the market are not irreconcilable opposites (Graw, 2010). There is no doubt that the dividing line between supposed territories is becoming increasingly permeable, that borders are moving, generating spaces that are difficult to classify and certainly not completely autonomous.

By way of conclusion, it is pointed out that the modern art system does not have to be a barrier in the artistic consideration of the work of engineering since it has a significant value that transcends even the symbolic value of other manifestations considered works of art. Therefore, the answer to where there is art can be intuited: in the so-called Fine Arts, but also the work of engineering.

2. The engineering work: a significant value

Beyond studies on the value of engineering from an economic perspective (Lanza, 2009), in the significance and the flight from reductionism, the common of art and engineering would be found. Currently recognized engineers advocate finding the significance of the engineering fact (Martínez-Calzon, 2013) and renowned artists the same: "The more I learn about the artistic process, the more aware I am of how we have labeled, amputated and reduced art, of how we have put art in a corset" (Cabellut, 2022).

There is consensus in the appreciation of the symbolic value of works of engineering such as the Eiffel Tower, which are part of what "must see" as works of art in the exhibition of the macro-museum that is a city. They are a claim for spectators who, looking for a special or transcendent experience, contemplate them and are moved. Likewise, they have acquired other meanings that bring them closer to art, since they would reflect the cultural trends of society, but without being a true reflection of it, since art represents what exists, but as a possibility of being perceived as something else, to transcend (Adorno, 2015). This consideration supposes a change of approach or plane of reference since at no time has it been proposed that the correspondence between art and engineering is based on its potentiality, on its enabling nature.

Art as an emotional concept is based on the mysterious. How can a theorem not be, therefore, an artistic fact? In addition, engineering, in what it takes from science and transmutes into specific forms through the intellect, comes close to that artistic fact. That intelligentsia does not mean that he denies art. Art has a very broad spectrum, and it is worth analyzing, for example, in this process, the figure of Masaccio who, with the "intellectuality" of his work, would achieve through his work "The Trinity" (Figure 4), transcend his artistry and overcome its basic techné to, without a doubt, open painting to great art.

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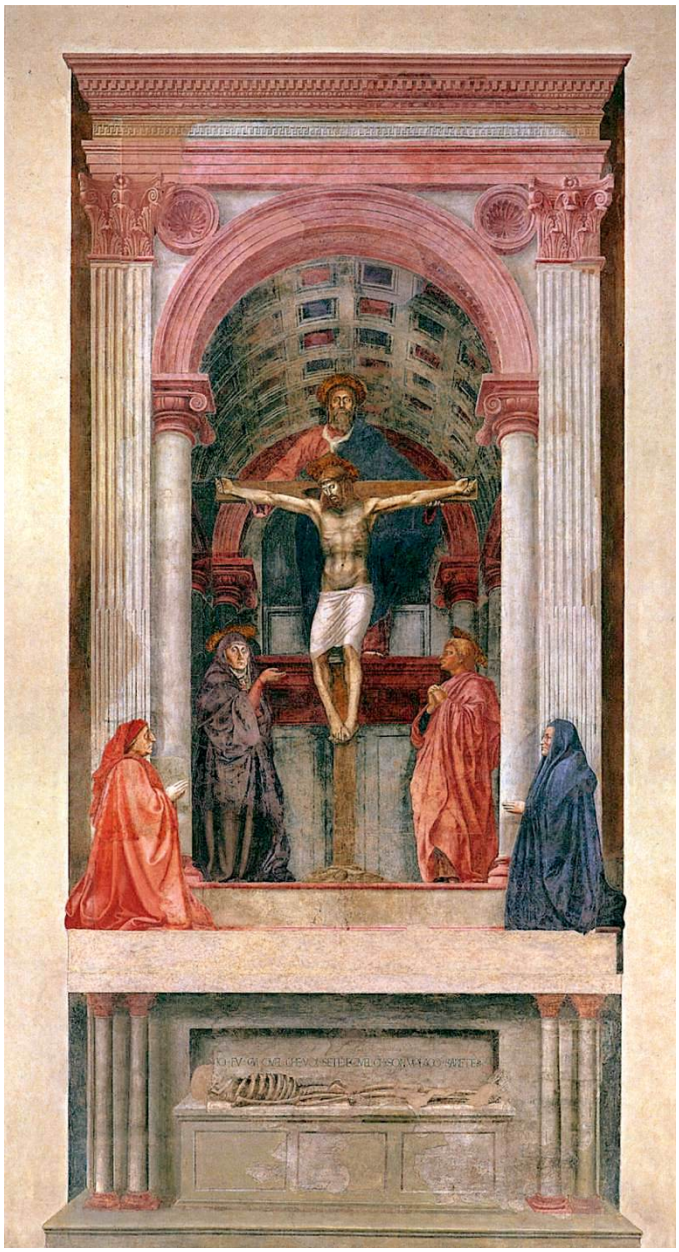

Figure 4. *The Holy Trinity, with the Virgin and Saint John and donors (Italian: Santa Trinità) by the Early Italian Renaissance painter Masaccio. (Source: https://historia-arte.com/obras/la-sagrada-trinidad)*

There is art in engineering when it transcends, just as it occurs in other manifestations. There are works of engineering that transcend and others that do not, as in painting, music, or literature; not every creation transcends its purpose: everything that achieves it is art; what is transversal to art and engineering is its significant value and the experience that comes with revelation.

It should be noted that engineering, in its intimate relationship with nature, does not help its recovery as an image of beauty, but rather transforms it, humanizes it, and elevates it to the rank of art (Vera, 2009). The foregoing does not mean that nature, due to the presence of public works, is elevated to the rank of art; since nature cannot be such a thing, since the work of art is a product made by the human being.

The value of the engineering work is also to be an identity element of the natural and urban landscape (Crespo and Rosado-García, 2021). In society, it has already become apparent that certain works of engineering have transformed uses and values and have become something else. Take the example of canals that today are a lure for leisure in cities, or the Golden Gate Bridge, which even though it maintains its main use, has become a tourist lure. The foregoing allows us to reflect on what engineering today represents, with new use values for leisure and tourism on its heritage value and its historical dimension, and, mainly, its potentially artistic value.

Revista Ingeniería de Construcción. RIC
Vol 37 Nº2 2022 www.ricuc.cl
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The value of the engineering work, understood as its degree of usefulness for a given purpose, must go beyond a quantitative or economic value and be qualitative: social-cultural, environmental, and a place. New policies and proposals (Rosado-Garcia et al., 2021) are guiding engineering to acquire new values as built heritage, from the point of view of social welfare and sustainability (Rosado-García, 2022).

In new projects such as the new Puente de Alcántara (Navascués and Goicolea, 2021)it is verified that new values related to the place are being taken into account, with what the community can do in them; Beyond the quantitative, their social value as new public spaces becomes relevant.

The qualitative value of the engineering work is to also generate a significant experience, which goes beyond the aesthetic experience since the signs have a deep intellectual value. The sign is an intellectual value, not of nature: it is something that comes from the depths of the human being and can only be understood by humans since neither animals nor nature has signed. Of the criteria on the value of heritage: testimonial, historical, aesthetic, and social, it is worth highlighting the latter, which is defined as the meanings that a place has for the people who are related to it. Likewise, the place is defined as the historical environment, of any scale, that has a distinctive identity that is socially perceived (Heritage, 2008).

We speak of exempt engineering work as a work that is surrounded by space, which entails the exempt form and therefore creates a reference power that eliminates another type of form; it is also an enabler of meaningful experience. It is necessary to identify with an expression the experience generated by the engineering fact and its value. The adjective "meaningful" allows us to overcome the primary experience or the mere symbolic value.
On the other hand, it should be noted that engineering finds identification with art if the concept of concealment is used, in the sense of appearance-disappearance (Barthes, 2007); if the importance of playing between presence and absence for art is identified, the art of engineering will become visible. This has a wide spectrum, of the visible and the hidden; it hides more than what appears on the outside. That is where the accent is placed in this work; in not trying to demystify the artistic manifestation until making it so close that it is consumed, one must avoid secularizing, eliminating meaning for the sake of being able to play: without distance, mysticism is not possible. It's why technology tends to spawn what it likes, including the sense of touch, zooming in and demystifying and exemplifying the polish of touchscreens (Han, 2015).

Regarding the concept of visibility, it is also appropriate to emphasize that, if art was hidden until the 19th century and was opened to society with exhibitions, the work of engineering, even at the hand of all, stands invisible on most the occasions. Engineering has not taken into account the marketing variable, considering it completely minor, but history has revealed the error, serving as an example the case of architecture and the knowledge of names of architects by society and not of engineers. The engineering work is hidden like the work of Velázquez that as part of the Prado museum (Bermejo, 1990). It only found visibility thanks to the importance of marketing with its temporary exhibition that brought together thousands of people in long queues to see something that was already there. The key seems to reside in selling engineering as an exhibition that must be seen following the simile used of "safari".

The key to contemporary art, too, is knowing the artist, which seems to approximate the engineering solution in its recognition by society, in which the authorship of their works is unknown even by the engineers themselves.

Metaphorically, as an example of what is shown and hidden, being likewise proposals that allow the rediscovery of heritage, Christo's work (Figure 5) serves with the approximation of the work of art and engineering. He leads us to reflect on the question that both contemporary art and current engineering work do not have a historical perspective; and thus, what is today a cannon in the art such as impressionism for example, at the time of its birth was rejected: temporary distance can place engineering in the field of art. The key to engineering to be a work of art lies in the transmitter-receiver binomial, in the significant experience. It should be noted that there has never been as much creativity as now, which is a good time for engineering,

Revista Ingeniería de Construcción. RIC
Vol 37 Nº2 2022 www.ricuc.cl
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Figure 5.*The Arc de Triomphe, in Paris, wrapped by the artist Christo*
(Source: https://elpais.com/cultura/)

Art as a weapon that seeks to provoke intellectually is close to engineering. The engineering work has a significant value that brings it closer to today's art, for which aesthetics, on the other hand, does not have to be its main objective; his closeness to conceptual art is evident insofar as he has somewhat lateralized beauty and the work as something pleasant.

It should be noted that the great current constructions do not have to move away from the sublimity that is associated with romantic considerations (Kosik, 2012), since they are not reduced to the material that generates well-being, but their grandeur mystifies, and in their domain man captures the sublime (Figure 6). The fact that uniformity has lateralized the sublime the beautiful and the intimate in modern cities, giving rise to the poetic (Kosik, 2012), does not justify that mastery of the technique is only an illusion of being above everything. Engineering shares with art the territory of the sublime, since it is also great, solid, dark, and rough (Han, 2015).

Revista Ingeniería de Construcción. RIC
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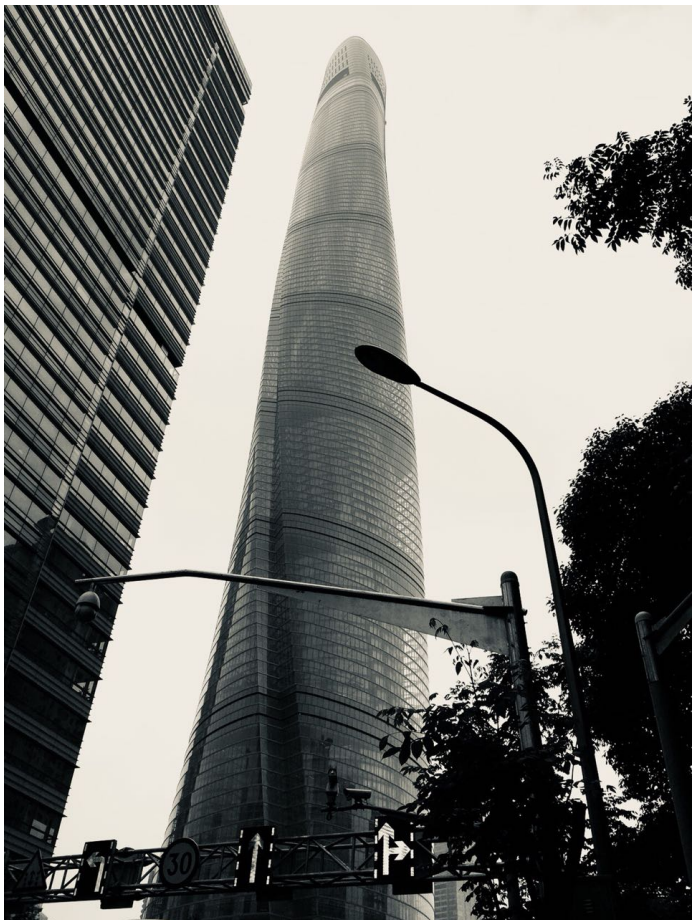

Figure 6. *The Shanghai Tower, the tallest building in China.*

That is to say, if the grandeur of constructions is not to be confused with the sublime, neither is it to be eliminated; but to project giving priority to beautiful issues in the sense of the Greek term "kalon": the elevated, the dignified, the sublime, the transforming that overcomes the dependence on the matter.

Although time, reflection, and intellectuality in structural design, for example, have undermined its essence in favor of immediacy, entrusting fundamental design phases to computer tools. It should not be ignored that the engineer must bear in mind that he is the maker of the form, which envelops and is not beautiful without its skeleton, just as the human face is not, just as a painting is not without its drawing or sketch. The skeleton, the anatomy of great works of engineering, makes the place signify the moment the field and matter are mastered: compositionally, analytically, and constructively (Figure 7).

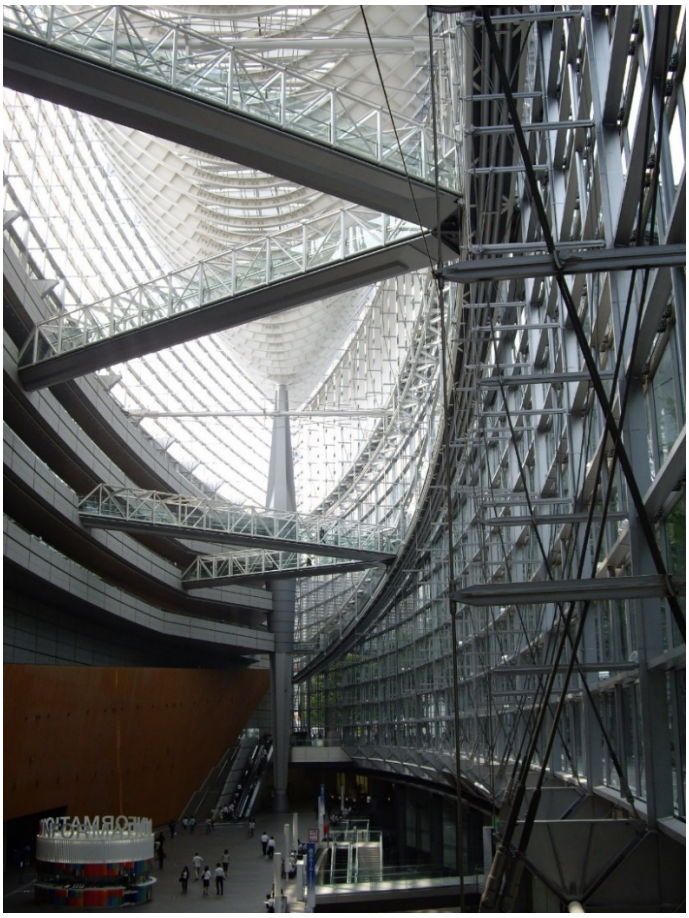

Figure 7. *Structural skeleton of the Tokyo International Forum*

The concept of significant value involves an achievement for engineering, just like the so-called significant form, which came out of a universe that had not participated in the formal fact; and what we have extracted from that area is significant from that area and was therefore not in anything that had been talked about until then. If the works of art in their current conception are about something, if they have a meaning; there is no doubt that in engineering works we deduce meanings, we perceive much more than its materiality, its functionality. The engineering work, therefore, shares the definition of a work of art as "meaning embodied" (Danto, 2013).

By embodied is meant the material, concrete, and steel configure the engineering work, being the viewer the one who has to interpret the properties and understand its meaning expressed in its matter.

It can therefore be said that if properties shared by art and engineering are not found, it is because only the visible ones are sought. It is the invisible properties that shape the significant value of the work of engineering, which make it art.

Likewise, the approach to art by engineering should not be limited exclusively to aesthetics; since it is nothing more than the reductionism of how engineering moved away from it in its transfer to architecture. If art is philosophically independent of aesthetics, as was established in the last century, it is enough to identify the conditions that are necessary for a work of engineering to be a work of art. Engineering has to worry about telling what it is about in its projects, in addition to aesthetics, if it wants to be recognized as art, which is not the same as denying that aesthetics is part of the work and undoubtedly of art.

3. Conclusions

The present work has exposed the multidisciplinary vision of bringing the concepts of art and engineering closer to the identification of their value. An approximation to the answer is presented about what art or engineering is, and more, where is the art; being able to transcend the work of engineering to the work of art in terms of symbolic object and merchandise.

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Art is associated with an economic value where his works are consumer goods, the conceptual and dematerialization did not manage to prevent them from being interchangeable. His intelligentsia fails in this case to reach the significant value of the engineering work, which dispenses with the merchandise completely.
On the other hand, what the engineering work should aspire to be unique, fleeing from the reproducibility that distances it from the status of the artistic work, in which each work is unique with the consequent aura of originality. Likewise, the status of authenticity is approximated by both works of art and engineering, since they are not perishable consumer goods, they last over time, and they outlive us, which contributes to reviving such status.

Conceptual art at the end of the 20th century strengthened the idea of the instability of the dividing line between what is and what is not art, which gives rise to allow the consideration and analysis of engineering from the art as a whole. The need to go beyond the limits of art must be addressed, which does not imply that everything could become art, and does not mean that everything is art. Likewise, it is essential to delve into the great philosophical contribution of the 20th century, that something can be art without being beautiful. What is significant about the works is the general property that somehow explains why art is universal and why it should accommodate engineering.

It is art then, an open concept as it is concluded in philosophy, and if it is not possible to find what is common with engineering in visual properties, it seems necessary to elevate the search for such properties to the intellectual, significant level. It is such properties that all works of art must share. The imitation was part of the definition of art for hundreds of years, and today the conceptual or abstraction makes them examples where it is difficult to find such attribute in its definition. Likewise, it is to be hoped that the significant value that it shares with engineering will lay the foundation for what will be identified as art by society in the coming millennia.

Throughout history, therefore, what is considered art has varied. That is why the definition that allows engineering to be encompassed as a whole, although it is much more, must capture a universal quality regardless of the time in question. The quality that has remained invariable in the work of engineering throughout history has been to be a reflection of the time, society, and culture; it has generated meaning since its construction. Likewise, art is a reflection of society and its trends.

Therefore, the philosophical theory that responds to the approximation of art and engineering is the materialization of ideas, of meanings, which is easy to understand in the case of abstract art. In this sense, both the work of art and that of engineering not only create an image but also give meaning to other things. They transcend materiality and create deeper meanings in their environment.

The foregoing seems to reconcile engineering, not always a bearer of beauty, with the Kantian bases of what is art, since in the vision of spirit beyond taste, in art as a defender that extracts meanings, engineering finds the common with art. The contemplation of works such as the Eiffel Tower reveals how the viewer's disposition is not only to see but also to find the meaning of what he sees.

In the same approach, it should be noted that just as it is illogical to deny that commercial art is art because it has a market value, denying that engineering and art share qualities are pure reductionism.

The problem of trying no longer to embed engineering in art, but to find the common value, lies in the fact that even current art could hardly be placed in the 18th century, with which even today society feels close and easily recognizes thanks to values of the then as beauty. The discontinuity of 21st-century art with what has been established for two millennia is so great that it is currently perceived as distant, so it will not be easy to incorporate the new engineering variable in the resolution of the equation of what art is.

Beyond concluding if engineering is art, beyond answering to what art is, one can easily answer where it exists: in engineering, and it is a clear example of significant value.

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