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Timber: materialization and abstraction

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Abstract

In *The Origin of the Work of Art*, Martin Heidegger explores the conception of ‘things’ as formed matter: if we appeal to use, function or purpose, form is prior to matter, since matter (*-mater*) wouldn’t be distributed in such manner where this not because of the form. If we elaborate this idea of “determination” or intention, the determinative character of the form is bound up with the purpose of the component made with a particular material, because material is something to be shaped according to intention. In the other hand, a second etymological meaning through the root *-mater* presents material as an agent of development: it spurs on processes than can be seen as extensions of the substance of matter, instigating perceptual possibilities, acting: absorbing, smelling, degenerating... Instead of the idea of determination, we are elaborating now the idea of “understanding”.

Triggered by this discussion on materiality and within the scope of timber as an architectural material, the following question is yet to be answered: is there an ideal form of the material, a form that gets closer than any other to that which timber should be? This work looks at the processes that have shaped and shape timber as a material in order to analyze if it can be released from culturally expected formal notions and respond to applications which extend its *material* history.

Introduction: a discussion of materiality

Any discussion of materiality needs to define the scope of such term, since it is open to several denotations and connotations. Two etymological sources of *material* bring up two basic complementary meanings through the root *-mater*. According to the first, material is that substance to be shaped; material is a substance for shaping. Secondly, material is a source of growth; material is an agent of development, the substrate from which physical existence is derived [1].

Appealing to this discussion of materiality, Heidegger explored the traditional conception of ‘thing’ that understands it as formed matter. Within this view, if we were thinking about the act of building with timber (a particular substance or thing), we would start forming the raw

material so that it would take on a specific shape. Here we should consider the two different ideas involved in the act of forming [2]. A piece of wood found lying in the forest is a material entity, naturally occurring without any given use, purpose or significance, and so its form would signify pretty much the distribution of the matter making up the piece of wood. But this notion of form is not always sufficient to justify the shape of a timber building component; here is when the second idea comes into play because form here is not so much the distribution of matter as what *determines* the distribution of matter. In this way form is prior to matter, since the matter would not be distributed in this manner where it not for the form. In the case of timber building components, this idea of determination is bound up with the component's function and purpose. Timber, in this context, is a substance understood through its applications, its ends. Its grain (or directionality and limitations) is considered primarily as a limit state or, expressively, as a bearer of cultural form. Also, wood takes the appearance of a body under transformation, a recording substance: joints and connections reveal the assembly and finishes bear the marks of mechanical processes, extrusions, abrasions. In this material strategy, that can be called indexical, wood is understood through the concepts that are marked into its surface. Material, as something that is given, is a state rather than a process. This materialistic reading of the term guides man to shape it according to an abstract formal notion, where space and form (the becoming object) fight for a common boundary.

The second and complementary meaning through the root *-mater* suggests a different material strategy. Material is here understood as a ground for the growth of ideas, as an agent of development. It does not express the processes which shaped it, but spurs on processes that can be seen as extensions of the substance of matter. Here, matter would not only appear as formed substance but as perceptual phenomena or stimuli in time and space. The grain of wood no longer operates as a limit state, but as the instigator of some perceptual possibility. In this phenomenological reading, matter acts: absorbs, smells, transports or filters light, degenerates... Matter, then, is something permanently unfinished.

The first reading of the term guided materialists to believe in an ideal form of matter, a form that gets closer than any other to that which matter should be. Guided by the second reading of the term, this work looks at the processes that have shaped and shape wood as an architectural material in order to analyze if it can be released from culturally expected formal notions (relating to its ideal form) and respond to applications which extend its *material* history.

The importance of matter in architecture: questions of material perception and material intention

Materialism holds that matter is the only substance because all things are composed of material and therefore all phenomena are just the result of material interaction. But the traditional conception of 'thing' and first reading of materiality fails to explain the essence of architecture. As Heidegger noted in *The Origin of the Work of Art*, the appeal to purpose applies awkwardly to works of art or architecture. The work of art or architecture would establish a way in which things make sense, serving to gather together and unifying, amounting to an understanding of being [3]. This essence is what architects want to discover, not just as an object of use, but as a physical body located in a place, firmly built with materials and washed by light. Architectural phenomenology discovers *intentionality* as a distinctive factor setting architecture apart from a pure phenomenology of materials: their tangibility, smell, colour, and acoustic qualities are the elements of the language that the architect uses trying to instill meaning to them in a particular architectural context, intending to transcend their physical condition. Meaning or articulation of intention behind a work of art or architecture is part of its essence and so the relationship between the experience of architecture and its generative concept is similar to the tension between empirical and rational [4]. The duality of phenomena and intention is like the interplay between phenomenal experience and the expression of meaning. While our experience and sensations engage us in the phenomena of architecture, the essence or driving force lies in the intentions behind. Peter Zumthor further developed this idea [5] of the poetic quality of a material in the context of an architectural work: although materials are not poetic by themselves, "they can assume a poetic quality in the context of an architectural object, although only if the architect is able to generate a meaningful situation for them". This poetic quality, this recognition or understanding of meaning is not ignited by the form itself but by its phenomena or stimuli, because their very essence is beyond all culturally conveyed (and therefore *expected*) ideal notions or material history. The challenge to art and architecture is to express meaning through phenomenal experience, in response to particularities of site and circumstance, understanding site-specificity not just as the way it is located in a particular place, but as its location with respect to a particular people and culture. Characteristically, architecture expresses meaning through the definition of space, by means of a material vocabulary, a constructive grammar and a structural syntax. These, together with the technical and structural basis are the fundamental prerequisites of architecture, the *conditio sine qua non* [6]. The technical and structural basis establishes a set of construction principles which are

independent of any particular project. However, all these tools remain unrelated and meaningless without the guidance of the spatial concept, the intention behind these tools. The presentation of architecture as space built with structure, gravity, light and matter is essential to its phenomenological presence because it develops existential metaphors through the metaphoric representation of the act of construction. As a way of defining space, the structural unit can be considered the prime architectural form because despite the volumetric quality of architecture, it is necessarily achieved by structural means. These serve to understand why architecture derives from some other reasoning since it results from the nature of the construction, and mainly from the values latent in one structural conception rather than another.

Materiality changes in timber: towards material abstraction

As opposed to steel or reinforced concrete, timber as a raw material is already a structural element, precisely a linear structural element. Traditional timber processing requires timber cross sections with a roughly consistent quality, meaning that only healthy, straight trunks could be used when producing planks, squared sections and boards. This explains why traditionally wood in architecture has been shaped according to a historic, linear form when the linear elements used in timber architecture indicated the limit state, the manufacture and the assembly of the material. But today, off-cuts and side boards of lower quality can be used, cut down into smaller strips, battens and laminations in a processing chain whose end is represented by chips and sawdust. This process of breaking down into ever smaller pieces is countered by an opposite process: assembly. Strips and laminations are usually glued together, thus increasing their structural strength. The smaller the components in the composite products, the more homogeneous their physical properties are. Similarly, the easier it is to influence these properties through the choice of assembly and the choice of (chemical or mechanical) binder. This ultimately means that today's timber manufacturing processes are able to challenge the limit state of timber and its traditionally related linear form, replacing it by a planar form produced by continuous casting and lamination: the panel. Panels, which can span in any planar direction, are those made from timber by-products whose structure within the plane of the panel tends to be isotropic. Since timber is naturally a directional, or anisotropic, material, this distinction and revision of the limit state of the raw material has only become possible due to progress in the manufacture of semi-finished and timber-based products, exemplified by cross-laminated timber panels. These panels show high strength and rigidity, achieving the behaviour of a plate. Structurally speaking, panels

are multifunctional: they carry different functions (load-bearing, bracing...), therefore they do not demand a structural hierarchy of primary and secondary elements and can be joined together without a hierarchy that articulates their formal expression. The homogeneous cross-layered composition of cross-laminated timber panels eliminates any recognizable internal hierarchy and means that it can be extended almost *ad infinitum* in the two surface dimensions making the timber sheet directionally neutral and extendable in all directions. Their homogeneous composition also means that openings do not even require a lintel, provided that there is enough material above the opening, in such way that assembly and cut are more similar to model-making.

These qualities have a direct impact on the phenomenological possibilities of timber. The considerable more consistent physical properties (compared to raw timber) allow the production of increasingly strong and slender elements. As the internal structure of the material is overcome and its dimensional order increases, the length of the joint decreases, allowing timber architecture to be materialized now with surface elements which are joined to form a stable assembly and ultimately the architectural form.

Finally, as timber architecture is no longer necessarily based on joining linear elements but can be implemented with the assembly of non-directional surface elements, their exposed continuous surface can trigger phenomenological possibilities not related to the directional linear element. Intention, perception and the built architectural body do not exist as separate entities: the implementation of architecture and its very materiality is both the means and the end. When process, matter and intention are fully merged, a substantial phenomenological change to the material opens up new metaphors to the architect's mindscape. Not appealing to a superficial use of the notion of *abstraction*, challenging, overcoming or reshaping a raw natural material (wood) to create a meaningful architectural metaphor can indeed be considered an act of architectural abstraction. Then, timber panels enrich the architectural theme of abstraction through the potential of larger slender elements that extend its traditionally ideal linear form.

Conclusion: can timber extend its material history?

A materialistic reading of the term matter (wood) guides man to shape it according to an abstract formal notion, where space and form (the becoming object) fight for a common boundary. This abstract formal notion or ideal form of matter is that form that gets closer than any other to that which matter should be. Traditionally, wood in architecture has been shaped

according to an ideal, historic, linear form and *its directionality* was considered primarily as a limit state or, expressively, as a bearer of cultural form.

In the other hand, under a phenomenological reading of the term matter, wood does not only appear as formed substance but as perceptual phenomena or stimuli in time and space and *its directionality* no longer operates as a limit state, but as the instigator of some perceptual possibility.

Modern timber manufacturing processes challenge the limit state and naturally-directional character of wood. As the internal structure of the material is overcome and its dimensional order increases, the length of the joint decreases, allowing timber architecture to be materialized now with *directionally neutral* surface elements which are joined to form a stable assembly and ultimately the architectural form.

Therefore, advances in production technology lead to the reshaping of raw timber and ultimately allow us to extend its material history, enriching the architectural theme of abstraction.

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