# Form(s) of Instability

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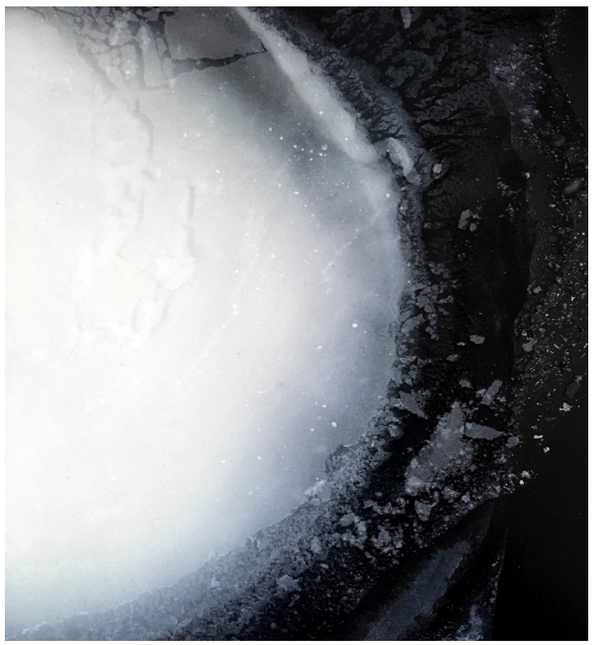

# *Form(s) of Instability*

*Demonstrations in the Architectural Potential of Weakness*

*PhD dissertation by*

*Karianne Halse*

ARKITEKTSKOLEN AARHUS

***book #1*** *(dissertation)*

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## *Summary*

This research project investigates material phenomena with a performative relation to forces from the perspective of *weakness.* The investigations depart from discoveries and observations of material practices of traditional building techniques, which present alternative ways of approaching the relationship between materials, instabilities and forces – differing from conventional building practice. Instead of seeking control and resisting forces, the examples work *with* forces – giving in by taking a sacrificial role or leaving space for material (dimensional) changes. The research is propelled by a fascination and wonder of a material approach that seems increasingly alienated from how we think and build today.

The research identifies – and explores – an emerging gap between formal appearance and material behaviour in the normative architectural building practice. Thus, the research questions the dominant role of formal (numerical/geometrical) control in contemporary architecture, which seems to have led to a lack of attention and understanding of material performance.

Within the research, the notion of weakness is used as a critical framework and theoretical apparatus to unfold the identified material examples and challenge normative building practice. G. Vattimo's philosophy of *weak thought* is used as a starting point for creating a theoretical framework constructed around the notion of weakness, supplemented by theories within the specific investigations and discussions that focus on performative and dynamic dimensions of the material. Furthermore, the notion of *formless* (*informe*, G. Bataille) is used as an operative term within the research. Formless informs the overall research framework of weakness on a material-specific level, giving attention to unstable and ephemeral material dimensions – and thus, contributing to an expanded

and less fixed way of perceiving the material world.

The research uses artistic practices as a mode of investigation to establish an engagement with the material, seeking particular insights into experiential, performative and imaginative dimensions. Thus, the investigations aim to turn attention towards overlooked dimensions and unseen material sides of the well-known. These artistic investigations enable a closer look at particular material phenomena, establishing a situated perspective from which to unfold and establish connections and overall perspectives.

Accordingly, the overall research structure establishes a framework to support a discovery-led research approach and facilitate movement between theory and practice. The research is centred around a set of *Demonstrations,* which builds up from three overall research components; *Measurings* give (empirical) insights into particular material situations through artistic practices. The *Operative Dictionary* materialise and organises theoretical perspectives through terms on index cards. Moreover, *Perspectives* bring in external references from art, which contributes to material perspectives and theory from an artistic point of view.

This research endeavour, as an experimental practice, is not prescriptive – neither aiming for solutions nor unequivocal answers. The research seeks to unfold potentials and gain insights into a process-oriented material approach, thus rendering visible inherent complexities, raising awareness and providing critical perspectives that can inform and discuss the architectural discourse.

## *Danish Summary*

Forskningsprojektet anvender *svagheder* som en overordnet optik og perspektiv til at undersøge materialefænomener med performative relationer til omgivende kræfter. Undersøgelserne udspringer fra observationer af traditionelle byggemetoder og -teknikker, som præsenterer alternative måder at tilgå forholdet mellem materialer, ustabiliteter og kræfter som afviger fra den gængse byggepraksis. Fremfor at søge kontrol og modstå påvirkning, udfordrer de fundne eksempler denne tænkning ved at arbejde *med* kræfterne – eksempelvis ved at være eftergivende, ofre sig eller at give plads til (dimensionelle) materialeændringer. Forskningen er drevet af en fascination og nysgerrighed for en materialetilgang, som i stigende grad synes fraværende i den måde vi tænker og bygger på i dag.

Forskningen identificerer – og udforsker – en fremspirende kløft, der synes at have opstået i den normative arkitektoniske byggepraksis, mellem det formelle udryk og materiale adfærd. Således stilles der spørgsmålstegn ved det dominerende fokus på formel (numerisk/geometrisk) kontrol der præger den nutidige arkitektur, hvilket til dels har afledt en manglende opmærksomhed og forståelse for materialeadfærd.

Svaghedsbegrebet anvendes som et overordret kritisk rammeværk og teoretisk apparat til at udfolde de identificerede materialeeksempler og udfordre den normative dirkurs indenfor bygningspraksis. G. Vattimo's filosofiske begreb 'weak thought' er udgangspunktet for etableringen af dette teoretisk rammeværk. Dette suppleres med yderligere teori, som relaterer sig til de specifikke eksperimenter og diskussioner, og har et særligt fokus på at udfolde performative og dynamiske materiale dimensioner. Endvidere anvendes begrebet *formløs* (*informe,* G. Bataille) som en operativ term i forskningen. Det formløse informerer det overordnede rammeværk på et materiale-specifikt niveau, med fokus på ustabile og flygtige

materialedimensioner – og bidrager således til en udvidet og mindre rigid måde at anskue den materielle verden på.

Forskningsprojektet anvender kunstneriske praksisser som en måde til at beskæftige sig direkte med materialerne, med det formål at afsøge specifikke indsigter i forhold til de oplevelsesmæssige og performative dimensioner. Derigennem søger de kunstneriske praksisser at rette opmærksomheden mod oversete materialedimensioner og sider af det velkendte. De kunstneriske undersøgelserne muliggør et fokuseret blik og forankret perspektiv på specifikke materialefænomener, hvor fra disse udfoldes og der skabes forbindelser på tværs, samt overordnede perspektiver.

Den overordnede struktur af forskningsprojektet understøtter en opdagelsesstyret tilgang til forskningen og faciliterer en pendulering mellem teori og praksis. Forskningen er centreret omkring et sæt *Demonstrations*, som opbygges fra tre overordnede forskningskomponenter: *Measurings* bibringer (empiriske) indsigter i specifikke materiale situationer gennem kunstneriske praksisser. *Operative Dictionary* nedfælder og organiserer teoretiske perspektiver gennem indekskort og termer. Endvidere tilfører *Perspectives* eksterne referencer fra kunstfeltet, hvilket bidrager med materialeperspektiver og teori fra et kunstnerisk perspektiv.

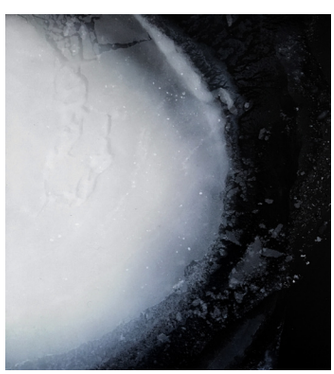
Forskningsprojektet, som en eksperimenterende praksis i sig selv, er ikke præskriptiv (at danne forlæg), og søger derved ikke konkrete løsninger eller entydige svar. Formålet med forskningen er at udfolde potentialer og at skabe indsigter i en proces-orienteret materialeforståelse, og derigennem synliggøre iboende kompleksiteter, samt øge opmærksomheden og bidrage med kritiske perspektiver til at tænke arkitektonisk med materiale processer og -relationer.

## *Inventory*

The PhD dissertation consists of this printed book (#1) and several appendixes. The appendixes form separate categories of material which are integral parts of the investigations:

**Book #2 (index cards)**
This book contains photographs of a collection of index cards, which operate as a theoretical device within the research. [fig.1.1] The cards – which organise theory excerpts around terms – will be further described in the chapter*, Researcher's guide (Operative Dictionary).*
The dimensions of the book are 180 x 135 mm.


**Book #3 (photographs)**
This book refers to this primary dissertation, providing the majority of the photographs – which appear in the margins – in a larger format. In some cases, the book also includes additional photographs which are part of the investigations. Besides giving each photo greater attention and enabling visual details, the photo book draws attention towards the various material sources independent of context, which has been put into relation through the research. [fig.1.2]
The dimensions of the book are 285 x 310 mm.



[fig.1.1, 1.2]

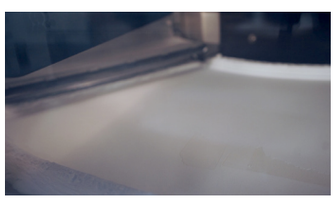
**Storyboard (printed on paper)**
This appendix is composed of individual sheets of paper, with the dimensions 594 x 420 cm. The storyboard describes the process of the research, outlining the research components and the relations between them.

Numbers and lines communicate the dimension of time and the investigational process as a choreography of steps and movement.

**Drawings (printed on paper)**
The appendix of (technical) drawings are geometrical investigations in section view, based upon four sectioned panel doors. The drawings are discussed in the chapter, *Discussions across Demonstrations.* The dimensions of the drawings are 1000 x 297 mm.

**Video work (digital)**
The video work comes as separate digital files. Image captures, which refer to the video work, are included in the dissertation (#1) as photographs in the margins (and book#3). The character of this component encourages close attention, presenting visual and sonic material information in an open and non-conclusive mode.

[fig.1.3]



[fig.1.4]

**D1**
(Karianne Halse, *'The Dramaturgy of Lime'*, 2019, video, 4:41). [fig.1.3]

*link:*
https://youtu.be/2DDyFLTPkX0

**D3**
(Karianne Halse, *'Layers of Powder'*, 2021, video, 3:50). [fig.1.4]

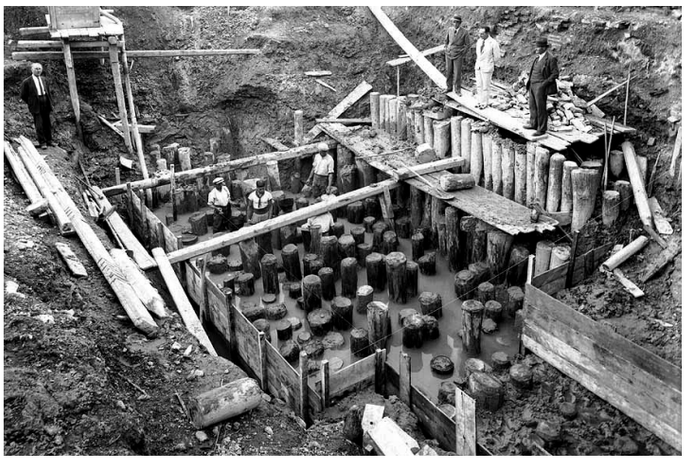
*link:*
https://youtu.be/LLc8O6L-BMA

The dissertation has a composite character. It combines diverse

investigations, material explorations, artistic analyses and theoretical perspectives. The graphical layout of this written dissertation attempts to communicate this compositeness and act as a way to guide and bring the elements together. The margins are used operative in this collocation of the various investigational elements, which will be described in more detail in the following chapter. This inventory and the following chapter seek to prepare the reader for the compositeness of the research.

As part of the PhD defence, an exhibition will be set up in connection with the defence. Here, in addition to the appendices described, artefacts will be exhibited. These artefacts, which are parts of material investigations – manipulated, constructed or acquired – are represented in the dissertation through photographs.

## *Table of contents*



## *(Prologue)* ***Venice***

This research begins with Venice.

[fig.2.1]

According to legend, the first stone was laid in the lagoon on March 25, in the year 421, by a group of refugees from the mainland.[1] Before then, the lagoon emerged slowly from a process of deposition of millions of cubic metres of silt, transported by the streams, rivers and torrents flowing across to the Adriatic Sea. A lagoon is a precarious and provisional place – neither land nor sea – expressing absence.[2] Geologically speaking, lagoons are unstable – constantly evolving – systems. The inherent nature is to merge with land or sea: either become silted up or, over time, blend in with the adjacent sea. C. Fletcher and J. Da Mosto describe how Venice's lagoon – if left to nature – would eventually have disappeared:

> 'The fact that Venice still exists is due to centuries of human intervention [...].'[3]

**1** Rosand, David. "Miraculous State." In Myths of Venice: The Figuration of a State, 12. Chapel Hill, NC: Univ. of North Carolina Press, 2007.

**2** Piazzano, Piero. "Venice: Duels over Troubled Waters." In The Venice Lagoon Ecosystem: Inputs and Interactions between Land and Sea, edited by Pierre Lassere and Angela Mazollo. UNESCO Publishing/Parthenon, 2000.

*The etymological origin derives from lacuna, Latin for 'an unfilled space; a gap'*

**3** Fletcher, Caroline, and Jane Da Mosto. "City in the Marches." In The science of saving Venice. Torino: Allemandi, 2004.

[fig.2.2]

Within the story of how Venice emerged from muddy flats, the foundation system of wooden piles has a crucial role. As the alluvial soil of the lagoon – composed of layers of silt, sand and clay – is endowed with very little mechanical resistance, it is incapable of bearing significant loads. Only in some areas and a few meters deep could the builders find a layer with sufficient mechanical characteristics, the *caranto*, consisting of the ancient compacted silt of the Veneto paleolagoon.[4] To increase the bearing capacity, Venetians developed techniques to shore up the ground. Allegedly, the wood piles 'were always placed by hand, by labourers working rhythmically to song.'[5] The wood piles become an underworld of Venice – an inverted forest of trunks – within the masses of alluvial deposits. [fig.2.1]

Walking around the city, one catches glimpses of this hidden world of material movements and interactions; underneath layers of lime plaster, in-between gaps, slightly displaced stone elements, vertical displacements and skewed horizontal lines – giving hints of relations on a greater scale. An environment in flux. Various sorts of metal pieces are located around on building facades, roofs, on bridges, on top of canal barriers – almost appearing as the city fabric is stitched together. *Fiube, regetta, zanche, grappe, capochiave.* These are the vocabulary of different types of metal elements, each with its history and particular use. One of these – which bespeaks of the tectonic system as a whole – is the particular Venetian material detail called *fiube.*

*Fiube* (from fiuba) is Venetian for 'belt buckle.'[6] The *fiube* is a structural device based on what could be translated as a weak connection (*debole collegamento*).[7] In a typical Venetian building, the connection between the internal partition walls and the perimeter walls is deliberately absent: the walls can thus move freely. [fig.2.2] The fiube is a composite device composed of a block of Istrian stone and an iron rod (arpese) filled with lead. It connects the outer walls to the wooden structure and allows vertical displacements between the parts it connects – thus, acting similarly as a hinge. [fig.2.3] Other Venetian material details as the binder of terrazzo, in-between gaps (such as between floor structure and perimeter walls) and the

**4** Piana, Mario. "Accorgimenti Costruttivi e Sistemi Statici Dell'architettura Veneziana." In Dietro i Palazzi: Tre Secoli Di Architettura Minore a Venezia, 1492-1803, 33–37. Catalogo Della Mostra. Venezia: Arsenale, 1984.

**5** Foscari Widmann Rezzonico, Giulia, and Rem Koolhaas. "Floor." In Elements of Venice, 294. Zürich, Switzerland: Lars Müller Publishers, 2014.

**6** Francesco Doglioni and Angela Squassina, "Legami, connessioni e sconnessioni nella tradizione costruttiva veneziana," in Venezia: forme della costruzione forme del dissesto (Venezia: Libreria Cluva, 2011), 96–97.

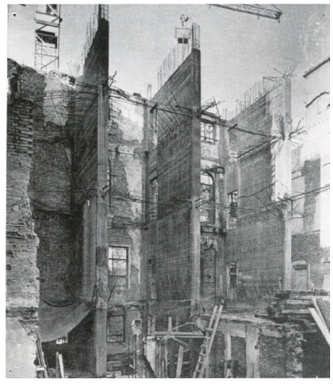
**7** Conforti, Claudia, and Andrew Hopkins, eds. "L'impiego del ferro nell'edilizia storica veneziana." In Architettura e tecnologia: acque, tecniche e cantieri nell'architettura rinascimentale e barocca, 1. ed., 126–39. II simposio 2. Roma: Nuova Argos, 2002.

[fig.2.3]

metal detail called ‘regetta’, will be describes later on as part of the investigations and discussions.

Incidents of a more recent past render visible a shift of attitude of building practice in Venice, reflecting a more general architectural shift toward universal solutions – disconnected from context and existing material relations. In search of optimisation, Venetian restorers in the 1960s and -70s introduced a widely used material technology at that time: *reinforced concrete.* However, this new material was completely out of place in Venice. Unlike the ‘softer’ principles of Venetian building tradition, concrete and iron do not give or move.[8] A building system which previously had allowed movement now became rigidly fixed. [fig.2.4] The result was a clash of two conflicting systems where the restored parts became too strong (rigid), causing failures for the remaining (original) weak parts of the building.

**8** Pertot, Gianfranco. “The Interwar Years.” In Venice: Extraordinary Maintenance, 128–30. London: Paul Holberton, 2004.



[fig.2.4]

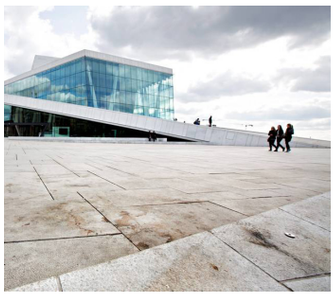
# *Introduction*

Moving beyond the surfaces of Venice – delving into the material depths – the prologue of this research presents a perspective which weaves together geological- and material processes, forces and tectonics. Venice comprises a building culture built upon a consciously composed system of materials developed in close relation to its environment. Venice permeates this research and plays an underlying role, initiates a way of reading materials and details and establishes a dialogue with the particular investigations throughout the research. More specifically, the material insights from Venice led to other discoveries and observations of material practices with a performative relation to forces – encouraging to look behind the well-known to re-discover.

The investigations depart from examples of traditional building techniques, such as (sacrificial) parge coat, lime mortar, panel doors and cleft wood shingles. Some examples were identified from the beginning, while others were discovered during the research process. These examples present ways of approaching the relationship between materials, instabilities and forces, which differs from normative building practice. Instead of seeking control and resisting forces, the examples work *with* forces – giving in by taking a sacrificial role, or leaving space for material dimensional changes.

This particular material attitude is investigated within the framework of *weakness.* Weak is a term which usually comes with negative connotations. The dictionary entry includes descriptions such as 'lacking the power to perform physically demanding tasks, 'not able to fulfil its functions properly,' or 'of a low standard.'[1] In a contemporary architectural context, the notion of weakness is associated with vulnerability, defects and shortcomings. However, this research project recognizes a

**1** Oxford Dictionary of English, *'weak'*



[fig.3.1, 3.2]

potential in the weak as that which gives (in) or leaves space – an attitude marginalised in contemporary architectural building practice. The identification of these particular examples of traditional building techniques is part of how certain challenges in the dominant building practices of today were discovered.

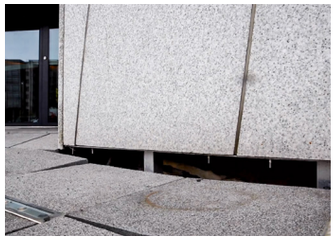
A contemporary architectural example is the *Oslo Opera House,* where considerable resources are used to counteract unintentional material changes – working against external forces and processes. With an outer expression resembling ice floes in the water and a walkable roof, the building is promoted as 'as much a landscape as architecture'.[2] However, the building lacks the dynamic properties of a landscape, which is intrinsically in constant change due to various processes. Instead, several initiatives seek to maintain a static and formal appearance. To prevent processes of discolouration inherent in the stone, the white (Italian) marble is treated with chemicals. Paradoxically, the polymer impregnation is suspected of having caused a chemical reaction of stains, creating another issue to be battled.[3] [fig.3.1] In-between the gaps of the marble tiles, seeds accumulate and provide excellent growing conditions for weeds – which are removed regularly.[4] [fig.3.2] Furthermore, substantial displacements have emerged between the two main sections of the building – between the part placed on solid rock and the part built upon unstable deposits in the water.[5] [fig.3.3] The Oslo Opera House epitomises an approach of keeping the pre-conceived under a regime of control by counteracting material changes activated by environmental forces and processes. Thus, in this case, material changes are considered an obstacle to a fixed formal appearance.

**2** https://snohetta.com/project/42-norwegian-national-opera-and-ballet

**3** Marfelt, Birgitte. "Polymerkemi Får Oslos Opera-Isbjerg Til at Gulne." Ingeniøren, March 31, 2014. https://ing.dk/artikel/polymerkemi-faar-oslos-opera-isbjerg-til-gulne.

**4** Eldrid Oftestad and Robert Hoftun Gjestad, "20 Millioner Er Ikke Nok Til å Holde Operaen Ren," Aftenposten, November 15, 2012.

**5** Per-Ivar Nikolaisen, "Bjørvika Synker," Teknisk Ukeblad, May 2, 2014.



[fig.3.3]

M. Mindrup describes this hierarchy and increasing tendency in the practice of architecture where the formal is valued over the material. According to Mindrup, the privileging of form over matter is deeply embedded in the architectural working practices. He draws historical traces and argues that since Alberti – in his architectural treatise *De Re Aedificatoria* (1452) – promoted the architect as a draughtsman of orthographic drawings, 'delineation has relegated materiality to a secondary role.'[6] Similarly, the architectural historian A. Forty describes

how architecture – in the work of physically shaping the spaces and material objects surrounding us – 'lays claim to particular privilege in matters of 'form'.'[7] In his chapter entry on *Form,* Forty provides an elaborate historical exposition of the term, tracing historical origins, different comprehensions and use within the architectural history. Forty describes the inherent ambiguity of the two senses of the term – between its meaning as 'shape' (the property of things as known to the senses) – and as 'idea' or 'essence' (known to the mind). Forty states:

> 'In its appropriation of 'form', architecture has, according to one's point of view, either fallen victim to, or taken mischievous advantage of this inherent confusion.'[8]

The current architectural notion of form as 'shape' can be traced back to modernism – where it was made into a cardinal term which, among other reasons, gave

> '[…] architects a description for that part of their work over which they held exclusive and unequivocal control.'[9]

Technology has enabled an increasing numerical precision of today's architectural working practices. Digital tools – such as CAD software, BIM models, simulation tools and renderings – push 'the limits of what it is possible to generate, control, construct, and imagine, in 2D, 3D, or time-based simulation.'[10] However, this increasing geometric control seems to have led to a lack of attention and understanding of material performance. As T. Bo Jensen points out, parallel to a technological development, there has occurred an asymmetry between our urge for optimisation and the inherent behaviour of materials.[11] Similarly, F. Hughes describes a material culture dominated by control, optimisation and prediction, where 'matter enters architecture repressed.'[12]

This research identifies – and explores – an emerging gap between formal appearance and material behaviour in normative architectural building practice. Thus, the research seeks to challenge the predominant role of numerical and formal control – exploring how material processes meet form

*index card:* ***formal***

**6** Mindrup, Matthew. "Interrogating the Gap between the Material and Formal Imagination: An Introduction." In The Material Imagination: Reveries on Architecture and Matter, 2. London: Routledge, 2017.

*index card:* ***form***

**7** Forty, Adrian. "Form." In Words and Buildings: A Vocabulary of Modern Architecture, 1st paperback edition., 149–50. London: Thames & Hudson, 2004.

**8** Ibid.

**9** Ibid., 161.

**10** Søberg, Martin, and Anna Hougaard. "Introduction." In The Artful Plan: Architectural Drawing Reconfigured, 1st ed., 11. Boston: Birkhäuser, 2020.

**11** Thomas Bo Jensen, "Molekylernes Hævn," Build Lasting Culture, KALK A/S, no. 1 (2016): 40–41.

**12** Hughes, Francesca. "The Troping of Precision: Hooke's Needle and Sutherland's Window." In The Architecture of Error: Matter, Measure, and the Misadventures of Precision, 33. Cambridge, Massachusetts: The MIT Press, 2014.

and unfold alternative perspectives of a process-oriented and relational material approach.

***research objectives***

The research is propelled by a fascination and wonder of a material approach that seems increasingly alienated from how we think and build today. With the examples of traditional material techniques as a starting point, the project seeks to investigate this approach of working *with* forces. Particularly, the project identifies a potential in the performative relation to forces that a weak approach involves, recognising a potential of a shift of attention within the architectural discourse. The research investigates the examples as material phenomena, seeking particular insights into the experiential, performative and imaginative dimensions.

The notion of *weakness* is used as an critical framework and theoretical apparatus to unfold the identified material examples and to challenge normative building practice. G. Vattimo's philosophy of 'weak thought' is used as a starting point for creating a theoretical framework constructed around the notion of weakness, supplemented by theories within the specific investigations and discussions that focus on performative and dynamic dimensions of the material. The notion of *formless* (*informe*, G. Bataille) is used as an operative term within the research. Formless informs the overall research framework of weakness, focusing on unstable and ephemeral material dimensions – and thus establishing a dialogue with form (understood as a device of material control). Weakness and formless are operative within this research for their capacities to disturb established notions and normative thinking, initiating an expanded and less fixed way of perceiving the material world.

The research seeks to investigate from a material performative and -relational perspective, focusing on ephemeral and dynamic conditions. Part of the research is to develop adequate ways to investigate these more elusive material dimensions. Artistic practices are used as a mode of investigation to unfold experiential and performative dimensions and establish an

engagement with the material phenomena. The investigations aim to turn attention towards overlooked dimensions and unseen material sides of the well-known – exploring from the perspective of an unstable, ephemeral, disorderly material world. Hence, to investigate weakness, it was critical to the research to enact relational performances in an experimental way, enabling a closer look at particular material phenomena to unfold material relations and forces and establish a situated perspective. Thus, the research develops from the particular, drawing out connections and overall perspectives.

The aim of the research is not to invent alternative modes of architecture or to replace established practices but to turn attention towards and unfold potentials of the marginal, minor or forgotten – generating insights and critical perspectives of architectural thinking with material processes and -relations.

*The project aims to*

1) use weakness as a critical framework to investigate material phenomena with a performative relation to forces

2) experiment with artistic practices as a mode of investigation to unfold experiential, performative material dimensions and turn attention towards the overlooked or unseen

3) unfold potentials and gain insights into a process-oriented material approach to challenge architectural thinking

## *Theoretical foundation*

The following chapter gives a closer introduction to the main theoretical concepts and terms operative in this project. The use of the notions *weakness/weak* in this research describes an overall approach to architecture as material systems, which involves a relational and process-oriented material focus. Thus, weakness acts as an overall framework of the research, through which the other theories – which operate on a more specific level within the particular investigations – establish a dialogue.

Materials and materiality are subject to an extensive amount of theory. A complete account would be an impossible endeavour and is not the aim of this research. Instead, the use of theory within this research departs from a material, relational perspective, seeking to unfold, describe and question relations between materials (and forces). The research combines a broad palette of theoretical positions, providing various perspectives that imply temporality, movement, and spatial and experiential dimensions. As the potential field of theory is so extensive, there are most likely theories with overlapping ideas or sharing borders with this research which are absent. Throughout the research, theory with a capacity to go into a dialogue with material investigations on a particular level has been favoured. Relevant theories have been included along the way, in close dialogue with material investigations and artistic examples. Some of these theories have been identified in the initial stages of the research, while the majority have been discovered and brought in along the research. The subsequent chapter, *Researcher's Guide (Method),* will elaborate on this process.

***weakness***

The research project investigates material phenomena with a performative relation to forces from the perspective of *weakness.* G. Vattimo's philosophy of 'weak thought' is used as a starting point for creating a theoretical framework for investigating the issues raised by these peculiar examples – establishing a link from a philosophical system to material systems. Within an architectural context, weakness brings a critical perspective of formal (geometrical) overarching control.

The philosophy of weakness derives from Vattimo's theories of *weak thought* (pensiero debole, 1983).[1] The theories are Vattimo's proposal for a philosophy of post-modernity against a globalising model based on truth, unity, and totality. The basic premise of this theory is the idea that it is no longer possible to pursue a complete, stable, metaphysical truth. Instead, one must rely on a hermeneutical truth – which is interpretative, partial, and provisional.[2] Vattimo's 'weak thought' was transferred to architecture in the 1980s, influencing the theoretical production of the post-modern. Ignasi de Solà-Morales's essay *Weak Architecture* (1987) is the most well-known example. However, his use of weak architecture should not be confused with how this research approaches the term. Solà-Morales' weak architecture emanates from the post-modern critique of Modernisms's unitary narratives, arguing for several points of view. Foucault's notion of archaeology was central in Solà-Morales' weak architecture, which was used to describe 'the superimposed reading(s) of tectonic reality:'[3] not regarded as a unitary whole, instead appearing as 'the overlapping of different layers.'[4] Solà-Morales proposes a diversity of times centred around 'event' (temporality) and 'monumentality' (recollection). P. Eisenman's introduced the concept of *weak form* within a post-modern (formalist) architectural context, where buildings were thought of as media carrying messages. With this notion, Eisenman sought to develop an architecture 'open to multiple readings, whose real nature is indeterminate and unstable.'[5]

An example considered more relevant for this research is the use of weakness within an urban architectural context. Based

**1** Gianni Vattimo, "Dialectics, Difference, Weak Thought," in Weak Thought, trans. Peter Carravetta, SUNY Series in Contemporary Italian Philosophy (Albany: State University of New York Press, 2012), 39–52.

**2** Pablo Martínez Capdevila, "Towards a Weak Architecture: Andrea Branzi and Gianni Vattimo," Cuadernos de Proyectos Arquitectónicos, no. 6, Diálogos Cruzados/ Antagonismos (2016): 147–50.

**3** Sola-Morales, Ignasi de. "'Weak Architecture.'" In Differences: Topographies of Contemporary Architecture, edited by Sarah Whiting, translated by Graham Thompson, 65–66. Cambridge: MIT Press, 1996.

**4** Ibid.

**5** Corbo, Stefano. "Introduction." In From Formalism to Weak Form: The Architecture and Philosophy of Peter Eisenman, 3. Ashgate Studies in Architecture. Farnham Surrey, England ; Burlington: Ashgate, 2014.

upon Vattimo's philosophy, the architect and theorist Andrea Branzi developed these principles into *weak urbanisation*. According to Branzi, the concept of weakness follows a more natural logic than the geometrical, as it 'proceeds following more incomplete, imperfect, disarticulated types of cognizance and transformation.'[6] In Branzi's optics, this weak concept is not seeking one definitive architectural solution and 'renounce the final state of stable perfection.'[7] Instead, it proposes more fragmented and heterogeneous scenarios where the unexpected is valued. Also, through the concept of *fragile architecture* (described as an equivalent to weak), J. Pallasmaa introduces architectural perspectives deriving from Vattimo's weak thought', which correlates with this research. Similarly to Branzi, Pallasmaa's favouring of an 'architecture of weak structure and image'[8] derives from a critique of geometrical and formal reduction that – in Pallasmaa's terms – rejects time. Pallasmaa gives an example of processes of weathering and ruination as a 'weakening' of the architectural image. According to Pallasmaa – in opposition to a 'strong' singular image and consistent articulation of form – 'a fragile form possesses aesthetic tolerance, a margin for change.'[9]

This research project uses Vattimo's philosophy – which was developed as a response to modernism's definitive and universal solutions – to argue for an expanded and less fixed way of perceiving the material world; and instead to uncover and acknowledge the inherent complexity, ambiguity and messiness of the unstable environment of forces and processes. Vattimo argues for a conception of existence that 'links being to time, life and the rhythm of birth and death,'[10] which – in an architectural context – suggests connecting the material to a greater scale or environmental system. Instead of considering local conditions as problems to be solved, a weak material ontology is relational, contingent, contextual, and historically conditioned. Thus, the research project seeks to compose and intervene in a more complex reality.

*index card:* ***weakness***

**6** Branzi, Andrea. "A Strong Century." In Weak and Diffuse Modernity: The World of Projects at the Beginning of the 21st Century, 15. Milano: Skira, 2006.

**7** Ibid., Capdevila.

**8** Juhani Pallasmaa, "Hapticity and Time - Notes on Fragile Architecture," The Architectural Review 207, no. 1239 (2000): 78–84.

Note: *Pallasmaa describes how he uses the notion of 'fragile' because of the negative connotation of the term 'weak'*

**9** Ibid.

**10** Gianni Vattimo, The Adventure of Difference: Philosophy after Nietzsche and Heidegger (Cambridge: Polity Pr, 1993).

***material relational perspectives***

Vattimo's 'weak thought' shares similar ontological themes

and thematic concerns with other bodies of theories and philosophies, such as French post-structuralism[11] (Foucault, Deleuze) – which have influenced more recent material theories, grouped as New Materialism. The research uses theories of New Materialism to establish a framework to transcend binaries of nature-culture, introducing non-hierarchical, relational perspectives.

This perspective can be viewed in light of B. Latour's critique of the purifying practice that defines modernity and modern science. Initiated by the first Enlightenment thinkers applying the Laws of Nature as a critical tool, natural mechanisms and material causality were separated from philosophy and human fantasy. B. Latour describes how illegitimate mixtures were turned into isolated categories. According to Latour, 'all the ideas of yesteryear, one after the other, became inept or approximate.'[12] The second Enlightenment of the nineteenth century further distinguished and separated into scientific categories. However, Latour points out that at the same time, there exists a conflicting practice in modernity, where hybrid systems mix across scientific categories (such as global warming, e.g.). To cope with the complexities, Latour argues for recognising the connections between nature and culture, similar to pre-modern ancestors as alchemy and astronomy.[13] Similarly, S. Walker describes how the new sciences of the seventeenth century rationalised matter. According to Walker, 'matter fell within the domain of modern physics, which sought a calculable and predictive understanding.'[14] Thus, matter became laundered of any fundamental indeterminacy – in Walker's terms – giving up 'all it secrets to physical science.'[15]

In particular, theories of relational ontologies contribute to the underlying theoretical foundation for this research with particular attention towards materiality and material relations. These theories contribute to a change of perspective into materials agencies – where the particular is weaved into a more extensive system (of other material elements, forces and processes).[16] Some theories have particular relevance, although the research does not adopt the specific terms. J. Bennett uses the term assemblages to describe 'ad hoc

**11** Influenced by Structuralism and G. Bataille

**12** Latour, Bruno. "The Power of the Modern Critique." In We Have Never Been Modern, 35. Cambridge, Mass: Harvard University Press, 1993.

**13** Ibid., 76.

**14** Walker, Stephen. "Gordon Matta-Clark: Matter, Materiality, Entropy, Alchemy." In Material Matters: Architecture and Material Practice, 45. London ; New York: Routledge, 2007.

**15** Ibid.

**16** Bennett, Jane. "The Agency of Assemblages." In Vibrant Matter: A Political Ecology of Things, 32. Durham: Duke University Press, 2010.

groupings of diverse elements, of vibrant materials of all sorts.'[17] M. DeLanda describes how materials have properties which emerge in meetings or relations (such as with other materials and forces).[18] Thus, materials have properties or behaviour that emerge when interacting within a particular context. Furthermore, the research draws upon the research of S. Sundahl, which with the basis of these mentioned theories, expands the concept of materiality in architecture into a process-oriented concept. Based on the relation of wood and fire, Sundahl investigates material behaviour and emergent properties. Through the research, Sundahl defines materiality as 'partly substance and consistency and partly process, force and becoming.'[19]

Bennett and DeLanda use a particular vocabulary to describe material interactions and relations – such as *actors, emergent properties* and *assemblages.* This research project has deliberately not inherited these terms, as it enables a more open and independent approach that can remain critical and allow other concepts that do not belong to the established direction to be part of the research. Another aspect of this decision is that the abstraction of the language of these terms – which resembles mathematical or chemical equations – runs the risk of comprehending on a superficial level, leaving no space for imagination. Theorists such as Latour and G. Harman express a similar concern. There is a risk of moving towards idealism, reducing to an 'idea of what things in themselves should be.'[20] Harman further criticises how things are replaced

> 'with abstract oversimplifications of what those things are, thereby suppressing their inner dose of mystery.'[21]

What Harman describes as an *inner dose of mystery* suggests an excess – something indefinite, beyond what could be described by terms and words. In the seek of explaining 'everything' lies a risk of reducing. The research recognises the contradictory aims of seeking to investigate and describe while simultaneously keeping the complexity alive. Harman argues for an 'object-oriented philosophy' consisting of autonomous objects, thus, rejecting Bennett's framing of things-operating-in-systems.[22] According to Harman, one of the problems with

**17** Ibid, 23.

**18** DeLanda, Manuel. "Realism and Materialism." In The Rise of Realism, by Manuel De Landa and Graham Harman, 11. Cambridge, UK: Polity, 2017.

**19** Sundahl, Stine. "Materialitet i Arkitektur Og Arkitektoniske Problemstillinger." In Materialeadfærd, 68. Copenhagen: Royal Danish Academy, 2019.

*Authors translation from Danish:*

'Jeg når nu frem til – afvigende fra gammel-materialismen – nærmere at bestemme materialitet som dels substans og konsistens og dels proces, kraft og tilblivelse.'

**20** Latour, Bruno. "Can We Get Our Materialism Back, Please?" Isis, no. 98 (2007): 139.

**21** Harman, Graham. "On Behalf of Form; The View from Archaeology and Architecture." In Elements of Architecture: Assembling Archaeology, Atmosphere and the Performance of Building Spaces, edited by Mikkel Bille and Tim Flohr Sørensen, 33. Archaeological Orientations. London ; New York: Routledge, Taylor & Francis Group, 2016.

**22** Harman, Graham. "Materialism Is Not the Solution; On Matter, Form, and Mimesis." The Nordic Journal of Aesthetics, no. 47 (2014): 94–110.

relational ontologies is that defining things through their relations 'allows object no surplus of reality beyond whatever they modify, transform, perturb, or create.'[23] The research draws upon Bennett's relational perspectives and theories of material vitality, while at the same time, the investigations also use Harman's theories actively as a counterpoint. Thus, the research has no interest in choosing a side. Instead, the investigations draw upon various insights and perspectives – attempting to use the multitude of understandings as an advantage for the research.

Through the research, indefinite theoretical concepts – such as *formless*, *base materialism* (Bataille) and *inframince* (Duchamp) – disturb established categories and nurture the ground for close attention and curiosity, promoting investigations of the elusive and ephemeral.[24] The following paragraph gives a closer introduction to *formless* as a central concept within the research, while additional concepts will be further described within the particular investigations.

**23** Harman, Graham. "Immaterialism." In Immaterialism: Objects and Social Theory, 10. Malden, MA: Polity, 2016.

*Continuation of citation:*
'[...] For if objects were nothing more than their current expression in the world, they could not do anything differently in the time that follows.'

**24** Matisse, Paul. "Introduction." In Marcel Duchamp, Notes, xv. Paris: Centre National d'Art et de Culture Georges Pompidou, 1980.

**25** Hegarty, Paul. "Art and Aesthetics." In Georges Bataille, 143. Core Cultural Theorist. London ; Thousand Oaks, Calif: SAGE Publications, 2000.

### *formless*

The notion of *formless* acts as an operative term within a formal architectural context as it articulates alternative unintentional material dimensions.

*index card:* ***formless***

Formless is an indefinite term which escapes fixed definitions.[25] G. Bataille introduced the term in his Critical Dictionary article *L'informe* (1929), which served as a critique of dictionaries' attempt to define and freeze all the significant words in a language into stable meanings. The opening paragraph of the entry on *informe* (formless) begins with:

> 'A dictionary begins when it no longer gives the meaning of words, but their tasks. Thus *formless* is not only an adjective having a given meaning, but a term that serves to bring things down in the world, generally requiring that each thing have its form. What it designates has no right in any sense and gets itself squashed everywhere, like a spider or an earthworm. In fact, for academic men to be happy, the universe would

**26** Bataille, Georges. "Formless." In Visions of Excess: Selected Writings, 1927-1939, edited and translated by Allan Stoekl, 31. Theory and History of Literature, v. 14. Minneapolis: University of Minnesota Press, 1985.

**27** Ades, Dawn, Simon Baker, and Fiona Bradley, eds. 2006. Undercover Surrealism: Georges Bataille and Documents. MIT Press ed. London : Cambridge, Mass: Hayward Gallery ; MIT Press.

**28** Hollier, Denis. 1989. "Introduction." In Against Architecture: The Writings of Georges Bataille, xiv. Cambridge, Mass: MIT Press.

> have to take shape. All our philosophy has no other goal: it is a matter of giving a frock coat to what is, a mathematical frock coat. On the other hand, affirming that the universe resembles nothing and is only *formless* amounts to saying that the universe is something like a spider or spit.'[26]

The notion of formless and other of Bataille's concepts which are closely related have an operational existence in various fields such as art,[27] architectural theory,[28] critical theory[29] and philosophy and anthropology.[30]

Within a material (theoretical) context, formless is connected to entropy. Á. Moravánszky describes formless as a 'weapon against idealism'[31] and the idealisation of material. A parallel has been drawn between Bataille's critique of the static form of the dictionary and the (static) formal ideal of architecture. The first entry in Bataille's *Critical Dictionary* defined 'Architecture' as epitomising 'form',[32] where architecture was used as the metaphor by Bataille 'of the idealism of man's project.'[33] Accordingly, Y.-A. Bois describes entropy as 'the repressed condition of architecture.'[34] Similarly, in an urban architectural context, T. Nielsen establishes formless as a material- and spatial condition closely connected to entropy and energy loss.[35] [fig.4.1] Nielsen investigates how unintentional left-over areas (wastelands) play an essential role as a backside of the city, possessing distinct material qualities and accommodating alternative activities to the 'high' enclaves.

However, it is within an artistic context that formless has become most well-known as a concept, demonstrating operational and performative capacities. Through the exhibition 'L'informe: mode d'emploi' / *Formless: A User's Guide* (1996) by Rosalind Krauss and Yve-Alain Bois, the concept of formless was used as a strategy for approaching and interpreting Modern art. Bois describes how formless is not a stable motif or a given quality; instead, it has merely an operational, performative existence.[36] The exhibition initiates a new taxonomy for the art of this century, replacing 'established readings based on a formalist and rationalist classification and lineal structure.'[37]

**29** Noys, Benjamin. 2000. Georges Bataille: A Critical Introduction. Modern European Thinkers. London ; Sterling, Va: Pluto Press.

**30** Crowley, Patrick, and Paul Hegarty, eds. 2005. Formless: Ways in and out of Form. European Connections, v. 11. Oxford ; New York: Peter Lang.

**31** Moravánszky, Ákos. "Immateriality and Formlessness." In Metamorphism: Material Change in Architecture, 301–2, 2018.

**32** Richardson, Michael. "Dictionary." In Undercover Surrealism: Georges Bataille and Documents, MIT Press ed., 92. London : Cambridge, Mass: Hayward Gallery ; MIT Press, 2006.

**33** Bois, Yve-Alain. "Threshole (Entropy)." In Formless : A User's Guide, 186. New York: Zone Books, 1997.

**34** Ibid.

**35** Nielsen, Tom. "Overskudslandskaber." In Formløs: den moderne bys overskudslandskaber, 81–98. Århus: Arkitektskolens forlag, 2001.

[fig.4.1]

**36** Bois, Yve-Alain, Rosalind E. Krauss, and Centre national d'art et de culture Georges Pompidou. "The Use Value of Formless." In Formless : A User's Guide, 18. New York: Zone Books, 1997.

**37** Hanru, Hou. "The Impossible Formulation of the Informe; On 'L'informe: Mode d'emploi.'" Third Text, Third Text, 10, no. 37 (1996): 91–93.

The diverse selection of artworks was organised around notions of “horizontality,” “pulse,” “base materialism,” and “entropy”, thus undermining normative curatorial principles such as period, style, oeuvre and theme. According to Krauss, the alternative organisation attempted to construct a discursive space to articulate alternative readings and new relationships between artworks and ‘units of experience’[38] – filling out blind spots of the art-historical understanding of High Modernism. Similarly, the art critic H. Hanru describes the exhibition as an ideal alternative and counterweight of High Modernism, which – through the use of formless – emphasises ‘the unstable, ephemeral, spontaneous and infinitely changing quality implied in modern art.’[39]

Moravánszky states that formless has not really found its way into architectural design.[40] Building architectural and design attempts have – according to Moravánszky – nothing in common with the artistic concept of formless. As an architectural example, Moravánszky discusses *Incidental Space* (2016) by C. Kerez which connects formless(ness) to amorphousness. Similar to examples from furniture design,[41] the installation of Kerez relies upon a geometrical understanding of form where the formless is comprehended as (static) amorphous shapes. [fig.4.2, 4.3] Moravánszky concludes that the term formless is ‘a difficult one for design and architecture’[42] as it

> ‘[...] strips material of any constructive role.’[43]

The research seeks to respond to Moravánszky’s dismissal of the formless in architecture due to not having ‘any constructive role.’ Thus, the research suggests that within a perspective of weakness and material relations/systems, formless might possess a significant role in architectural construction; however, not as it is typically thought of in terms of structural role. The investigations seek to establish a formless perspective and an alternative taxonomy which emphasises that the non-structural is equally vital.

The research seeks to establish a comprehension and framework of formless, which comes closer to the artistic concept and thus, in a similar way, utilising the operational,

**38** Sedofsky, Lauren. “Down And Dirty: ‘L’informe’ At The Centre Georges Pompidou. Lauren Sedofsky Talks with Rosalind E. Krauss and Yve-Alain Bois.” Artforum, Summer 1996.

**39** Ibid., Hanru.

[fig.4.2, 4.3]

**40** Ibid, Moravánszky.

**41** Hackenschmidt, Sebastian, and Dietmar Rübel. “Formations of the formless.” In Formlose Möbel Formless Furniture, 17. Ostfildern: Hatje Cantz, 2008.

*index card:* ***formless***

**42** Ibid, Moravánszky.

**43** Ibid.

performative capacities of the term. The research draws upon the theories of T. Stoppani, which uses the notion of formless to investigate architecture from an ephemeral, unstable perspective. Stoppani describes how formless indirectly expands the definition of architecture by exploring 'the space that architecture defines in open and dynamic terms'[44] – beyond an 'image of architecture or its edifice as building.'[45] According to Stoppani, the informe (formless) should be read 'as a verb

> – to in-form, to give form to, to put oneself into a form, to find a form, but also to question it, escape it, modify it, etcetera. Incidentally – matter has a form, and it is in the *informe* that the dynamic dimension of its variation is included.'[46]

The research primarily draws upon Stoppani, Krauss and Bois's comprehension of formless, which has established the term within a material perspective and an academic field operative for this research. In addition to informing on a theoretical level, Krauss and Bois's curatorial work and publication have inspired this research and written dissertation on a structural and compositional level.

*A note on the use of terms:*
The various theories and perspectives that inform the research subject bring different terms. The considerations of not adopting the terms used in theories of relational ontologies (Bennett, De Landa) has previously been described. Throughout the investigations, the research uses terms which (usually) bring negative connotations, such as *weakness, formless, instability* and *irregularity*. These are value-laden terms – similar to terms within the investigations, such as *noble* (metals) and *sacrificial* (anode/layer) – which relate to a discussion around morals or values embedded in materials.

The research utilises the subversive character of these negatively loaded terms as part of the critical framework, as the

**44** Stoppani, Teresa. "Dust Revolutions. Dust, Informe, Architecture (Notes for a Reading of Dust in Bataille)." The Journal of Architecture 12, no. 4 (September 2007): 439.

**45** Ibid., Stoppani.

**46** Ibid., Stoppani, 443.

language actively works with conventional understanding and normative thinking through an inverse operation. What is coined weak is, in fact, more robust, or what is conceived as formless demonstrates essential capacities. The active language based upon friction share similarity with Bataille's *Critical Dictionary* and his aim of releasing 'irruptive energies' of words.[47] Through the investigations, the negative-laden terms are connected with material insights and other concepts/terms, thus creating more nuanced perspectives, which move beyond binary conceptions.

**47** Noys, Benjamin. "The Subversive Image." In Georges Bataille: A Critical Introduction, 18–19. Modern European Thinkers. London ; Sterling, Va: Pluto Press, 2000.

Further described in *Researcher's guide (Method)*.

## *Researcher's guide (Method)*

The following chapter describes the overall research structure and mode of operation (method), acting as a manual describing the role and the relation between the different research components.

### *artistic practices*

The research project begins with a kind of wonder and is 'discovery led rather than hypothesis led.'[1] A set of material examples with a performative relation to forces acted as the starting point, seeking to unfold the material qualities and potentials of these examples from the perspective of *weakness.* To support an explorative approach, the research objectives are intentionally formulated with openness and not as questions to be confirmed or rejected. E. Cocker describes how the starting point of not knowing (as it is for any research) is 'not an experience stripped clean of knowledge,

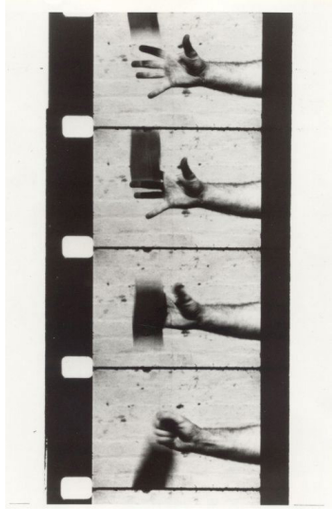
> 'but a mode of thinking where knowledge is put into question, made restless or unsure. Not knowing unsettles the illusory fixity of the known, shaking it up a little in order to conceive of things differently.'[2]

The research is not seeking to develop or invent design proposals but to turn attention towards overlooked dimensions and unseen material sides of the well-known – exploring from the perspective of an unstable, ephemeral, disorderly material world.

The research uses artistic practices as a mode of investigation to provide alternative ways of engaging with the material world, disturb habitual rhythms and create a setting for close attention to experiential, performative dimensions. The artist R. Serra describes how artists – like himself – use strategies to extend their vision, creating frameworks to turn attention towards material processes. [fig.5.1] According to Serra, artistic

**1** Borgdorff, Henk. "The Production of Knowledge in Artistic Research." In The Routledge Companion to Research in the Arts, 1st ed., 56. London: Routledge, 2012.

**2** Cocker, Emma. "Tactics for Not Knowing; Preparing for the Unexpected." In On Not Knowing: How Artists Think, edited by Elizabeth Fisher and Rebecca Fortnum, 131. London: Black Dog Publishing London UK, 2013.



[fig.5.1]

tools, techniques or processes allow you 'to see into a material manifestation in the way that you would not if you dealt with standardized or academic ways of thinking.'[3] Similarly, Cocker describes how artistic tactics can be used 'for attending to that which is habitually unnoticed, for slowing down [the] process of observation, for cultivating second sight:'[4]

> 'The faculties of perception by which we come to understand the world might need to be restricted, limited or otherwise impaired.'[5]

The subject of investigation is familiar elements and materials that often come with historical, cultural or practical connotations, limiting the perception of the observer. The philosopher Dag T. Andersson describes a visual world shoved aside, forgotten and repressed due to functional concerns. According to Andersson, the child's open and imaginary gaze is a reminder of a visual richness of things, which belongs to 'an order deprived of the logic of goal-oriented usefulness':[6]

> 'When the child follows the father working at the carpenter's bench or the mother at her sewing machine, the German Jewish philosopher and literary critic Walter Benjamin writes, it is not the finished products that the child is primarily interested in, but the remnants or "waste material". The child's attention is directed towards the wood shavings and scraps of fabric and threads that fall onto the floor, where they create a world of their own; an "underworld" having its own peculiar visual richness. [...] The childlike gaze is attentive to aspects of the things that allow the mutability they are subordinate to come into view.'[7]

Analogous to the childlike gaze, the research seeks to establish an attentive and experiential framing of materials and material arrangements not limited by practical restrictions and conventional understanding. To establish a 'new or estranged view on a familiar thing',[8] the artistic technique of *defamiliarisation* is used as a methodological device and investigational force. Initially, a literary technique, defamiliarisation – or what the Russian formalists called ostranenie – presents common things in an unfamiliar or

**3** "Richard Serra: Tools & Strategies." Interview. Art in the Twenty-First Century, January 2013. https://www.youtube.com/watch?v=G-mBR26bAzA.

**4** Cocker, Emma. "Tactics for Not Knowing; Preparing for the Unexpected." In On Not Knowing: How Artists Think, edited by Elizabeth Fisher and Rebecca Fortnum, 128. London: Black Dog Publishing London UK, 2013.

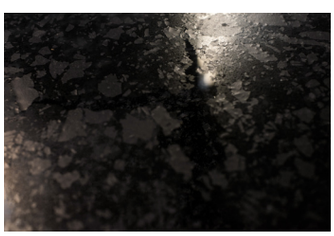
**5** Ibid.

*index card:* ***order***

**6** Dag T Andersson, "The Order of Incompleteness," in Arkiv: De Ufullendte, by Kari Steihaug, trans. Francesca M Nichols (Oslo: Magikon, 2011).

Benjamin, Walter. "Byggeplass." In Enveiskjøring. Barndom i Berlin - rundt 1900, translated by Bjørn Aagenæs and Henning Hagerup, 21. Oslo: Aschehoug, 2000.

**7** Ibid.



[fig.5.2]

**8** Uspensky, B. A. "The Structural Isomorphism of Verbal and Visual Art." In A Poetics of Composition: The Structure of the Artistic Text and Typology of a Compositional Form, 131. Berkeley: University of California Press, 1973.

strange way (from an exterior point of view) to force the viewer outside the usual pattern of perception.[9] A central aspect of this estrangement is increasing the difficulty of what is perceived and thereby increasing the length of perception.[10] Shklovsky describes the technique as *taking reality out of context.* In this research, the material investigations are situated through particular set-ups where material effects can be examined. [fig.5.2]

In addition to enabling a particular framing to observe materials, these artistic investigations involve a bodily engagement with the material. Material processes such as *slaking, pouring, stirring* (lime), *dissecting, cleaving* [fig.5.3], *assembling* (wood), and *excavating* (nylon powder) create a bodily interference with the material, which contribute to an understanding of material logic and behaviour. Other practices within the research involving architectural tools, such as drawing and digital 3D-software, further contribute to this embodied thinking and knowledge. The research draws upon M. Johnson's process-oriented conception of knowledge as 'embodied cognition,' which connects knowledge to experience.[11] Johnson emphasises 'knowing as a process of inquiry rather than a final product'[12] and recognises the role of the body as a capacity for understanding and knowing.

Finally, artistic practices activate a broader palette of formats and tools of investigation, with a focus on performative and experiential dimensions. The artistic framework allows for intervening with the material independently of practicality. As the investigations seek to interact with the material, factors of time and scale set some boundaries. Within the investigations, materials with unstable properties (which operate on a short time frame) have been favoured – or material situations with an 'age' to measure upon – manageable in size and scale. Thus, the research is not particularly looking into material processes/ surface phenomena such as weathering or patina. These are material processes which – with most building materials – would demand years or decades to investigate. Furthermore, weathering and patina have already received significant attention as research subjects within architecture.[13]

**9** Botz-Bornstein, Thorsten. "Tarkovsky's "Logic of Dreams'." In Films and Dreams: Tarkovsky, Bergman, Sokurov, Kubrick, and Wong Kar-Wai, 1. ed., 6–7. Lanham, MD: Rowman & Littlefield, 2008.

**10** Victor Shklovsky, "Art as Technique (1917)," ed. David Lodge (London: Longman, 1988), 16–30.

[fig.5.3]

**11** Johnson, Mark. "Embodied Knowing through Art." In The Routledge Companion to Research in the Arts, 1st ed., 145. London: Routledge, 2012.

**12** Ibid.

**13** *Such as:*

Leatherbarrow, David, and Mohsen Mostafavi. Surface Architecture. Cambridge, Mass.: MIT Press, 2002.

Hill, Jonathan. Weather Architecture. Hoboken: Taylor and Francis, 2013.

Algreen-Petersen, Albert. "Patina: Arkitektonisk Motiv Og Informant." PhD dissertation, Det Kongelige Danske Kunstakademis Skoler for Arkitektur, Design og Konservering, 2019.

***Demonstrations***

The overall research structure centres around a set of *Demonstrations.* Each Demonstration unfolds from a central material element which embeds a particular perspective on (material) weakness. In D1, the central element is the material condition of *lime* – in D2, it centres around the traditional *panel door* – and in D3 departs from *cleft shingles.* Each Demonstration builds up from three overall research components, which are:

- *Measurings*
- *Operative Dictionary*
- *Perspectives*

Discussed in greater detail below, these three research components organise partial perspectives, giving insights into the central element from a particular point of view. The partial perspective presents a mode of investigating which W. C. Dimock describes as seeing

> 'just a little way ahead, behind, and to the sides, conceiving even of its field in partial and provisional terms.'[14]

*Measurings* give (empirical) insights into particular material situations through artistic practices. The *Operative Dictionary* organises theoretical perspectives through terms materialised as index cards. Furthermore, *Perspectives* bring in external references from art which act as discussion partners.

D. Haraway describes how the partial and situated view seeks knowledge 'for the sake of the connections and unexpected openings situated knowledges make possible'.[15] The partial perspective is an approach to research which opposes distant and autonomous objectivity, which – according to Haraway – is 'being nowhere while claiming to be everywhere equally'.[16] Similarly, T. Ingold points out the impossibility of giving a complete account of a phenomenon, an artefact or a living organism without reducing it.[17] Every description or measurement would be partial. The particular perspective acknowledges the limitations the specificity of the investigation

**14** Dimock, Wai Chee. "Weak Theory: Henry James, Colm Tóibín, and W. B. Yeats." Critical Inquiry 39, no. 4 (2013): 732–53.

**15** Haraway, Donna. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." Feminist Studies 14, no. 3 (Autumn 1988): 575–99.

**16** Ibid.

**17** Ingold, Tim. "On Weaving a Basket." In The Perception of the Environment: Essays on Livelihood, Dwelling and Skill, 344, 2011.

gives. Within a Demonstration, these various perspectives describe alternative angles by giving presence to alternative material dimensions or establishing new connections between material perspectives and theories. Together, these perspectives and relations between them seek to compose a complex and multifaceted account of the material phenomena.

The research structure of Demonstrations breaks up the traditional linear narrative of a research process and operates as a *field of relations.* This structure operates non-hierarchical and enables connections between things which belong to different categories. The research structure as a field of relations can be understood through the architectural theorist S. Allen's notion of *field conditions.* Allen uses field conditions to address and engage with complex relations and dynamic behaviour in architecture and urbanism, establishing 'a shift of attention from traditional top-down forms of control and investigate a more fluid bottom-up approach.'[18] Allen describes a field condition as a formal or spatial matrix that can unify diverse elements and simultaneously respect their identity.

> 'Field configurations are loosely bound aggregates characterized by porosity and local interconnectivity. Overall shape and extent are highly fluid and less important than the internal relationships of parts, which determine the behavior of the field. Field conditions are bottom-up phenomena, defined not by overarching geometrical schemas but by intricate local connections. […] Form matters, but not so much the form of things as the forms *between* things.'[19]

**18** Allen, Stan. "Field Conditions." In Points + Lines: Diagrams and Projects for the City, 1st ed., 92. New York: Princeton Architectural Press, 1999.

**19** Ibid.

Similarly, the research structure of Demonstrations seeks to ensure that each perspective keeps its particular qualities while simultaneously establishing relations and generating insights across. The fragmentary and partial relationship between theory and practice within a Demonstration can be described through the concept of *relays.* First introduced by G. Deleuze – and more recently developed by the architectural theorist J. Rendell – the concept of relay is described as

> 'one discourse forms a link or passage between aspects of the other – theories travel between practices and

practices travel between theories.'[20]

Hence, an essential part of the research takes place in the relations *between* the various elements and partial perspectives. In some instances, there are direct overlaps through shared themes or terms, establishing a link or passage across the research perspectives. In other cases, gaps between perspectives of theories, material investigations or artistic examples create a fertile ground for associative thinking and mental connections. In some cases, friction between the elements acts as an operative force, similar to Bataille's release of irruptive energies.[21] These overlaps, frictions and gaps share similarities with J. Löwgren's *intermediate-level knowledge,* which occupies 'some territory between the particular artifacts and the general theories.'[22] The artistic practice purposely subverts the dichotomy of the object and the process. Thus, the ontology of the Demonstration is the connections, perspectives and processes – and not the actual physical artefact which is made *(lime pool, film, plastic shingle).*

Allen's understanding of field conditions in architecture implies a *tactical sense* – as a botanist or anthropologist engaging in fieldwork.[23] Similarly, the research develops through individual steps and actions. Instead of using a pre-defined method or order developed strategically, the research is carried out in a gradually composed open system where relevant components are brought in and built up along the way. Thus, the method is being imposed and grows as it goes along, informing the decisions made. Through this process, the initial framework of the research is reinforced as part of the research. Hence, there is a constant exchange between investigation and construction. Furthermore, there is a correlative relationship between theory and material investigations, which involves moving back and forth. Through the use of indefinite concepts such as *weakness* and *formless,* the investigations unfold material phenomena. At the same time, the material investigations inform the understanding of the concepts. Consequently, the organisation of parts within this dissertation does not correspond directly to the order in which the research has been carried out.

**20** Jane Rendell, "A Place between Theory and Practice: Critical Spatial Practice," in Art and Architecture: A Place Between (London: I. B. Tauris, 2006), 26.

**21** Benjamin Noys, "The Subversive Image," in Georges Bataille: A Critical Introduction, Modern European Thinkers (London ; Sterling, Va: Pluto Press, 2000), 18–19.

**22** Jonas Löwgren, "Annotated Portfolios and Other Forms of Intermediate-Level Knowledge," Feature, no. interactions (2013): 30–34.

**23** Ibid., Allen.

This reversal of the order of research methods differs from more traditional modes of research, which pose 'research questions and then finding answers.'[24] J. Rendell describes how a typical research process in design research operates through *generative modes* – 'producing works at the outset that may then be reflected upon later.'[25] The research component Measurings plays an essential role within a Demonstration by initiating a particular framing which sets a direction for the investigations. The research started from an example from a collection of material examples identified prior to the research. In fact, any of these examples could be the starting point, as they were discovered through a hunch, and there was no hierarchy between them. The most important at that point in the research process was to start engaging directly with physical material to generate a basis for dialogue with theory. As S. Allen points out,

> 'To make something new requires a leap into space where the rules are not yet fixed. […] If you start with a fixed end in mind, you foreclose the possibility of discoveries made along the way.'[26]

The insights which were generated from these initial investigations did not contribute directly. Nevertheless, the outcome became important as stepping stones, pointing the following investigations in a slightly different direction and establishing a boundary for the research on an overall level. Thus, artistic practices have set things into motion, followed by subsequent reflection and analyse. Other practice-based/artistic research projects in architecture with a similarly open and explorative approach which are relevant to mention, are PhD thesis projects of M. Lahmy,[27] P. Lucas,[28] E. L. Nielsen[29] and Y. Manolopoulou.[30]

The three research components of each Demonstration, *Measurings, Operative Dictionary* and *Perspectives* will be further described at the end of this chapter – followed by an introductory paragraph of the three Demonstrations.

**24** Rendell, Jane. "A Way with Words: Feminists Writing Architectural Design Research." In Design Research in Architecture, by Murray Fraser, 117, New edition edition. Burlington: Ashgate, 2013.

**25** Ibid.

**26** Allen, Stan. "Working." In Hunch 11. Rethinking Representations, edited by Penelope Dean, 116–21. Rotterdam: The Berlage Institute, 2007.

**27** Lahmy, Maya. "Processing Imperfection - Exploring Creative Possibilities in the Digital Architectural Drawing Process." PhD dissertation, Aarhus School of Architecture, 2018.

**28** Lucas, Pavlina. "The Photographic Absolute: An Architectural Beginning." PhD dissertation, Oslo School of Architecture, 2013.

**29** Nielsen, Espen Lunde. "Architectural Probes of the Infraordinary - Social Coexistence through Everyday Spaces." PhD dissertation, Aarhus School of Architecture, 2017.

**30** Manolopoulou, Yeoryia. Behind the Image. Design Research in Architecture. Burlington: Ashgate Publishing Company, 2013.

***exploring relations through writing***

Throughout the research, there is a parallel process of adding perspectives to the field and *writing* as a mode of exploring these relations. Through the process of writing a Demonstration, parts of the non-hierarchical field are turned into a linear structure – extracting particular focal points from the combination of various perspectives. This mode of exploration involves leaps and jumps between perspectives and a combination of focusing on details and zooming out to establish an overview and follow trajectories.

The graphical organisation of the page (within the dissertation) seek to visually convey the research structure as a field of relations. Here, the *margins* play a central role. The notion of the marginal and marginality as a minority position connects to weak theory. However, within this written dissertation, the margins are not marginal but are, in fact, central to the reading of the project. Similar to the historical practice of Marginalia, where writing in the margins was an ongoing process after the publication of the book, the margins are actively used for annotations – giving clues. The margins of the page are used for the various perspectives (of the Operative Dictionary, Measurings or Perspectives) and ensure a relation to the main text of the dissertation. Thus, the margins single out the perspectives in operation, while the central column of the page establishes relations between the various perspectives. Index card references are signalled with the file term of the card in the margin and a type which differentiates from the main body text. Photos refer to artistic material investigations (Measurings) or external material examples (as Perspectives) and connect to specific appendixes such as the photo book, drawings or video work. Furthermore, the graphical organisation encourages the reader to trace perspectives – follow theoretical or material trajectories through the appendixes. Altogether, the field of relations allows oblique, diagonal, sideways, or roundabout readings.

There are perspectives from the field which is not incorporated into the particular written Demonstration. Nevertheless, everything always remains ‘at play’ – although their relations

are not focused on. The structure of the research allows even the 'rejected' to stay in play, which resonates with a weak thought: that which is non-structural is still essential. Examples of Measurings not part of a Demonstration are 3D scans of façades from Venice or index cards with various terms from the Operative Dictionary. These (untold) perspectives remain within the field as potentials for an ongoing and continuous process of further Demonstrations.

***weak theory***

The particular approach to theory of the research corresponds to what K. Stewart coins *weak theory.* Weak theory organises a minor domain (of partial perspectives) and has a particular potency to account for 'near' phenomena.[31] Stewart – which operates within a research context of ethnography – describes a kind of theory which follows trajectories, as it

> 'comes unstuck from its own line of thought to follow the objects it encounters, or becomes undone by its attention to things [...].[32]

Weak theory is employed in related research fields such as archaeology,[33] social science[34] and affect theory[35], which – similar to architecture – are concerned with material objects, complex relations and ephemeral phenomena. Weak theory can, according to Stewart, account for things which are not simple or self-contained:

> 'things noted obliquely, as if out of the corner of the eye [...] things that have impact [...] caught in a circuit of action and reaction.'[36]

With the notion of weak theory, Stewart presents an approach to investigating complex material relations and phenomena by delving into the particular moment or event – 'the poesis of a something snapping into place.'[37] 'the moment itself when an assemblage of discontinuous yet mapped elements throws itself together into something.'[38] According to Stewart, this *poesis* 'has to be traced through the generative modalities of impulses, daydreams, ways of relating, distractions, strategies, failures, encounters, and worldings of all kinds.[39] In a similar way

**31** Tomkins, Silvan. In Affect Imagery Consciousness, Vol. 2, The Negative Affects, 433. New York: Springer, 1963. Tomkins is also quoted in Sedgwick, Touching Feeling, 134.

**32** Stewart, Kathleen. "Weak Theory in an Unfinished World." Journal of Folklore Research 45, no. 1 (2008): 72.

**33** Pétursdóttir, Þóra, and Bjørnar Olsen. "Theory Adrift: The Matter of Archaeological Theorizing." Journal of Social Archaeology 18, no. 1 (February 2018): 97–117.

**34** Sedgwick, Eve Kosofsky. 1997. "Paranoid Reading and Reparative Reading; or, You're So Paranoid, You Probably Think This Introduction Is about You." In Novel Gazing: Queer Readings in Fiction, 1–44. Durham, N.C.: Duke University Press.

**35** Ibid., Tomkins.

**36** Ibid., Stewart, 71.

**37** Ibid., 73.

**38** Ibid., 80-81.

**39** Ibid., 73.

within the research project, Measurings makes visible material phenomena which are investigated through diverse and 'local' theories instead of conforming into one encapsulating theory. Stewart emphasises that the point of this kind of theory is

> 'not to judge the value of analytic objects or to somehow get their representation "right" but to wonder where they might go and what potential modes of knowing, relating, and attending to things are already somehow present in them as a potential or resonance.'[40]

The research consists of many and diverse elements where discoveries can be made on different levels. The individual Measuring brings with its particular set-up material insights. As a Demonstration combining various perspectives, a meta-level of insights is generated. Furthermore, another meta-level is established in the discussion across the three Demonstrations – through detecting overlaps, divergence or gaps. Thus, the research insights are tangled into the web of relations and are not giving solutions or unequivocal answers, verifiable through falsification or providing proof.[41] As phenomena can not be accounted for through standard descriptive definitions and numbers, S. Kjørup describes – in the context of artistic research – how the strength of the argument is based upon the overlaps.[42] Kjørup quotes Wittgenstein, which extends the concept of numbers into a metaphor of spinning a thread:

> 'in spinning a thread we twist fibre on fibre. And the strength of the thread does not reside in the fact that some one fibre runs through its whole length, but in the overlapping of many fibres.'[43]

As C. Dyrssen states, 'answers are only one part of generating knowledge.'[44] According to Dyrssen, it is of equal importance to produce new questions and alternative ideas and perspectives 'as part of a shared action space extended over time.'[45] The role of this kind of theory is to be suggestive and generative, 'providing gateways for communication and dialogue across paradigm borders.'[46] The research is not looking for unequivocal answers. Instead, the insights of the investigations render visible inherent complexities – vital for experiential and

**40** Ibid., 73.

**41** Gaver, William. "What Should We Expect from Research through Design?" In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 943. ACM, 2012.

**42** Kjørup, Søren. "Pleading for Plurality: Artistic and Other Kinds of Research." In The Routledge Companion to Research in the Arts, 1st ed., 29. London: Routledge, 2012.

**43** Ibid. Kjørup, 35.

Wittgenstein, Ludwig. "§67." In Philosophical Investigations, 1953.

**44** Dyrssen, Catharina. "Navigating in Heterogeneity: Architectural Thinking and Art-Based Research." In The Routledge Companion to Research in the Arts, 1st ed., 225. London: Routledge, 2012.

**45** Ibid., Dyrssen.

**46** Ibid.

imaginative dimensions. Hence, the research aims to raise awareness and provide alternative sides and perspectives which can inform the architectural discourse.

The following paragraphs give an introduction to the three research components within a Demonstration:

***Measurings***

The Measurings establish an artistic framework for interacting with and reading the material. Materials or material systems related to examples of traditional building practices act as a direct starting point. This research component investigates the material from an experiential perspective, relying on close attention and sensitivity towards ephemeral material qualities. Thus, it becomes a portal into a material world of instabilities, material backsides, movement and temporal dimensions. [fig.5.4]

[fig.5.4]

*measurements as a colon (index)*

First and foremost, the Measurings create a set-up for focusing upon the particular (matter). At the same time, the character of these investigations – which expands beyond established standards and formats – challenges the normative power of standard formats.

The etymological origin of the noun *measure* comes from 'moderation', from the verb *moderare 'to control'*.[47] Within the denomination of this research component, *Measurings,* lies a questioning of a common conception of measurements as something objective and absolute. An intentional friction is generated between the notion of a measuring closely tied to standard formats – and the particular character of the material investigations in this research project. Correspondingly, the art critic and editor of *Billedkunst* Kjetil Røed points out a significant difference between a measurement as a *punctum* or a *colon,*[48] exemplified by a historic handprint on a cave wall. Concluding measurements in standard formats such as cm/inch, kg/pounds, and litres, Røed coins a *punctum*. If looking solely at the size of the hand in centimetres, we will have a limited understanding of the imprint and the body that can be derived from the outline. According to Røed, the handprint is also a colon – an entrance into a world that has

**47** Oxford Dictionary of English: *'measure', 'moderation'*

**48** Kjetil Røed, "Kunsten gir form til det som ikke lar seg måle," Billedkunst, 2019.

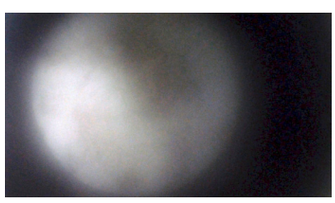
been traversed but can be imagined through the imprint. Further on, Røed emphasises how art makes visible dimensions that are not so easily quantified in standard formats or statistical forms and asks for recognition of other ways of measuring the world and, thus, what realities are made available to us. Thus, this research component intends not to devalue or replace geometrical measurements but to introduce alternative ways of measuring to shed light on alternative (material) dimensions.

**49** Emmons, Paul. "Introduction." In Drawing Imagining Building: Embodiment in Architectural Design Practices, 8–9. S.l.: Routledge, 2020.

The kind of measurement Røed describes as a colon corresponds to what C. S. Pierce coins an *index* – where signs have a direct material relationship with their objects.[49] Within this research context, material changes and effects are considered an index of invisible forces, material movements and interactions.

**50** Stewart, Kathleen. "Weak Theory in an Unfinished World." Journal of Folklore Research 45, no. 1 (2008): 73.

Described in *weak theory.*



[fig.5.5, 5.6]

*set-up/scene*

The Measurings create a specific set-up for interacting with and reading the material, which displaces the material into a new spatial framing, triggering material effects and making hidden dimensions visible. This set-up is equivalent to what the ethnographer K. Stewart describes as a *scene*.[50]

The strategies and set-up for the Measurings are developed specifically for the particular investigation, depending on the material dimensions the research seeks to explore. In D1, the Measurings establishes a framework to examine a building material by taking it from an architectural context and exploring it as a material phenomenon. [fig.5.5, 5.6] In D2, the Measurings interferes with an existing material object to make visible hidden interior conditions. In D3, the Measurings investigates material conditions and processes by constructing of (material) objects.

*intensified seeing*

Within the material observation and reading, the camera as a tool plays a crucial role in establishing an attentive gaze and recording ephemeral moments. The Measurings uses

two different camera devices; a Sony reflex camera with a macro lens (50mm) for close-up photography and video and an endoscopic camera (ø5mm) used for minor-scale interior photography.

Art theorist R. Krauss describes how the camera indicates a break or 'rupture in the continuous fabric of reality'[51] and imparts a particular framing:

> 'In cutting into the body of the world, stopping it, framing it, spacing it, photography reveals that world as written.'[52]

This perspective of camera framing as a kind of *writing* points out the active role of the camera within the Measuring. With this follows recognition of the impossibility of representing perceived reality with scientific objectivity. And furthermore, a consideration of how the research set-up of the Measurings can work intentionally with this as a precondition – 'creating subjective, positioned encounters and representations.'[53]

Through a *close-up perspective,* the Measurings establishes close attention to the material set-up, working actively with a dimension of defamiliarisation. As a research technology and epistemology, the close-up – which is magnification through a lens – traces back to studies of the natural world. D. Ades describes how the technique of magnification 'changed the viewer's perception of the world and challenged the primacy of the human eye as interpreter.'[54] As an artistic technique, the close-up has demonstrated defamiliarising and disruptive capacities through the unmanipulated images of Surrealist photography, which through the close-up perspective, recorded 'the inherent strangeness of reality itself.'[55] Ades describes the close-up perspective as *intensified seeing.* Through isolation, fragmentation and close cropping, the magnified detail reveals visual information difficult to perceive with the naked eye – heightening the reality of everyday objects.[56] This heightened reality describes Ades as an

> 'endless unfolding of new worlds through progressive magnification of little things.'[57]

**51** Krauss, Rosalind E. "Photographic Conditions of Surrealism." In The Originality of the Avant-Garde and Other Modernist Myths, 12. print., 115. Cambridge, Mass.: The MIT Press, 1985.

**52** Krauss, Rosalind E. "Photography in the Service of Surrealism." In L'amour Fou: Photography & Surrealism : Hayward Gallery, London, July to September 1986, 40. London: Arts Council, 1986.

**53** Nielsen, Espen Lunde. "Urban Cartographies and Paradoxes of Representing Reality." In Architectural Probes of the Infraordinary - Social Coexistence through Everyday Spaces, 173, 2017.

**54** Ades, Dawn. "Little Things: Close-up in Photo and Film 1839-1963." In Close-up: Proximity and Defamiliarisation in Art, Film and Photography, 9–10. Edinburgh: Fruitmarket Gallery, 2008.

**55** Jodi Hauptman and Stephanie O'Rourke, "A Surrealist Fact," in Object:Photo. Modern Photographs: The Thomas Walther Collection 1909–1949 (New York: The Museum of Modern Art, 2014).

**56** Ibid., Ades, 22.

**57** Ibid., Ades, 44.

The Measurings also utilise the camera's capacity to condense time, capturing ephemeral moments and stretch sequences. Within the Measurings, both mediums of photography and video are used, depending on the particular investigation. Photography captures and investigates particular moments or spatial conditions, while video records processes over time.

The video work draws upon the cinematic concept of *weak narration,* exemplified by A. Tarkovsky. A weak cinematic narrative deliberately creates a distance between the image and the narrative to weaken the logic of the story.[58] R. Bird further elaborates by describing how Tarkovsky was 'not an orator, but an observer and a listener.'[59] According to Bird, 'Tarkovsky's camera tracks the moments in which the elements speak.'[60] [fig.5.7, 5.8] Similarly, the Measurings seeks to follow the material flow and observe processes. Like Tarkovsky's weak narration, the video work of the Measurings are open and non-conclusive – signalling the importance of paying attention.

[fig.5.7, 5.8]

**58** Corbo, Stefano. "Introduction." In From Formalism to Weak Form: The Architecture and Philosophy of Peter Eisenman, 4. Ashgate Studies in Architecture. Farnham Surrey, England ; Burlington: Ashgate, 2014.

**59** Bird, Robert. "Introduction." In Andrei Tarkovsky: Elements of Cinema, Reprinted., 9. London: Reaktion Books, 2010.

**60** Ibid., 12. .

***Operative Dictionary***

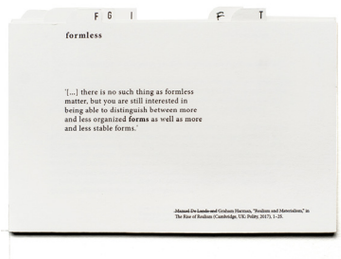
The *Operative Dictionary* is a device for recording, storing and connecting theoretical perspectives, organised as a collection of individual index cards *(122,6 x 78,4 mm, printed on 200g technical drawing paper).* [fig.5.9, 5.10]

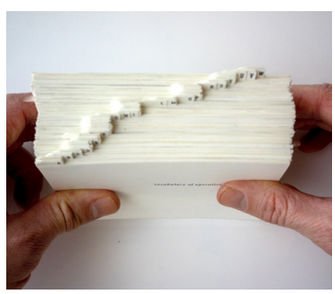
The Operative Dictionary operates as a dynamic tool built up throughout the research project through an accumulative process. The format of the separate cards combines 'the need to bring information into a fixed order for purposes of later retrieval, and the need to permanently integrate new information into that order.'[61] The theoretical perspectives of the Operative Dictionary act as a palette of available ideas which transcends categorical boundaries.

Within the designation Operative Dictionary lies a reference to G. Bataille's *Critical Dictionary* and his critique of fixed definitions. B. Noys describes how

> '[t]he incompletion of the critical dictionary was a critique of the tendency of dictionaries to try to define all the significant words in a language by freezing their irruptive energies into stable meanings. [...] Instead of being organised by meaning the critical dictionary was organised by the tasks of words, trying to release their irruptive energies.'[62]

Similarly, within the Operative Dictionary, theoretical positions are filed under a particular term central to – and included in – the excerpted text. The specific term activates the theory by imparting a particular weight affecting the comprehension of the card. Some of the terms which play a central role are comprised of several cards. Thus, this organisation of theory based upon terms enables different theoretical positions to co-exist. Terms with more cards indicate a more prominent role within the research and act as anchor points within the field of relations – while terms with fewer cards indicate a minor and more specific role within the research. Examples of key terms accumulated during the research are *form, formless, instability, measurements, infrathin, play, dust,* and *precision.* Together the various terms and cards provide a theoretical vocabulary of

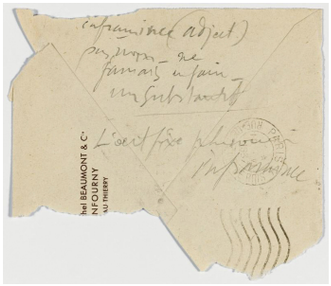


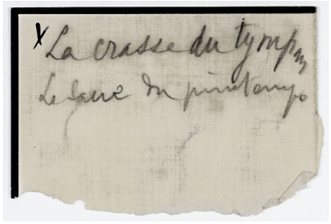



[fig.5.9, 5.10]

**61** British Society for the History of Science. "Carl Linnaeus Invented The Index Card." ScienceDaily. ScienceDaily, 16 June 2009.

**62** Noys, Benjamin. "The Subversive Image." In Georges Bataille: A Critical Introduction, 18–19. Modern European Thinkers. London ; Sterling, Va: Pluto Press, 2000.





[fig.5.11, 5.12]

nuances – and even contradictions.

The format of individual cards shares the fragmentary and accumulative character of the handwritten notes left behind by Marcel Duchamp – some being pivotal elements of artworks such as *Green Box* (1934) – while others were published posthumously. T. Girst describes how the ephemeral character of Duchamp's notes – 'in their typographical rendering, complete with crossings out and changes [...] (often on torn pieces of paper)'[63] – were fixing fleeting thoughts and ideas, as a sort of *informal archiving device.* [fig. 5.11, 5.12] Similarly, the ephemeral character of the index cards promotes intuitive findings and discoveries of theory – depositing theoretical insights which *potentially* would be relevant. Unlike Duchamp's notes, the index cards operate with a strict format. The physical dimensions and graphical organisation of the cards set some boundaries for the extent of the citation. Moreover, the strict format activates a specific approach to combinations and connections of cards and becomes an artistic strategy for operationalising theory within the research.

The index card is both a reference to a theoretical source and acts relational, making combinations with other cards – generating connections across relevant disciplines, theoretical positions and philosophies. As a physical artefact, the card gives agency to combinatory practices of adding, moving, shuffling, flipping, shifting and pairing cards. Thus, the cards are physically actived and can be combined, arranged, fixed to images, positioned next to material artefacts, pinned on the wall, made a mark with a pencil, and so on. The dynamic and operational use of the index cards operationalises a weak theory approach, establishing a method for a situational and relational use of theory which goes into a dialogue with material investigations (Measurings) and (Perspectives). Different theoretical positions are connected through shared terms, which allows them to be discussed across each other. Also, the cards facilitate a possible cross-reference across different terms, where the theoretical excerpt acts as a bridge. Gaps between different positions become productive, providing a space for reflection and questions. The cards utilize the ambiguity of

**63** Thomas Girst, "Notes," in The Duchamp Dictionary (London ; New York: Thames & Hudson, 2014), 130.

**64** Jane Rendell, "Chapter 2: Insertion as Montage," in Art and Architecture: A Place Between (London: I. B. Tauris, 2006), 126.

language ‘to relay as well as anchor.’[64]

Despite the uniform format of the cards and seemingly identical appearance, a closer inspection reveals minor material differences. Thus, each card has a material presence emanating from changing material conditions (of paper and ink), material processes (printing and cutting), and temporal dimensions (of storing and use). These minor variations of the material are related to paper textures (as the paper has been bought over the years and from different suppliers) and ink quality on the print (which can be traced back to the use of various printers). Furthermore, the cards are cut by hand, giving slight deviations in each card’s outer contours. The cards also embed time, having traces of age (where the paper and ink have become bleached) or some cards which are more active and bear marks of wear as pencil marks or stains.

The format of the book (appendix) presents the index cards at a particular moment. Thus – as photographs – the role of the cards is changed from an operative device into a (less active) representational role.

[fig.5.13, 5.14]

***Perspectives***

The research component *Perspectives* contextualises among artistic precedents, where examples from the field of art inform on several levels. The Perspectives act as a discussion partner to the Measurings on a material-specific level and contribute to the Operative Dictionary on a theoretical level.

On a material-specific level, the Perspectives give insights that establish a dialogue with the Measurings, acting generative and offering particular perspectives. The role and time of activation of the research component within the research process differ among the Demonstrations. In D1, the research component is activated in parallel with the Measurings. In this case, the artistic examples contributed with specific material insights which built further upon the discoveries of the material investigations, thus strengthening and elaborating on the findings. In D2, the particular artistic example establishes the research subject as a familiar object and surface condition, which nurtures the ground for the disruptive dimensions of the Measurings. Furthermore, another artistic (architectural) example goes into dialogue with the method and the findings of Measurings. In D3, the artistic examples act as a lens to read the Measurings through.

The artistic examples bring in theoretical perspectives from an art theoretical or -historical point of view, which informs the Operative Dictionary. These theoretical inputs position the particular example into an art-specific material context and contribute with a vocabulary centred around experiences and aesthetics. Singling out these artistic examples is a crucial part of the investigations, which contributes to identifying overall themes and categories of the research. Thus, the research component acts as a testing ground for insights and discussions, validating the direction of the overall Demonstration.

The artistic examples, meticulously selected in relation to the particular material perspective within a Demonstration, come from art-specific material contexts and are part of artistic movements. Thus, the examples establish possible trajectories

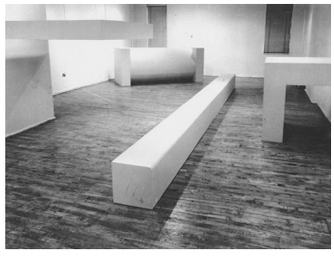
**65** "Smithson and Serra: Beyond Modernism?" Documentary. Modern Art, Practices and Debates. BBC, 2002 1993.

into artistic periods and societal tendencies, which reflect the material approach of the particular example. In D1, the artistic examples come from *process art* (R. Serra [fig.5.13, 5.14], J. Beuys), which presents an artistic approach of using materials with dynamic and unstable capacities. The material is active, and the material changes are intentional and an integral part of the work. Process art developed as a response to Modernist art,[65] which initiates a possible parallel discussion between art and architecture of objects and process. In D2, the artistic example from *Post-impressionism* (V. Hammershøi) mirrors the material object of the investigation, thus materialising the societal shift and transition between tradition and modernity (between the 19th and 20th centuries).[66] Furthermore, the artistic (architectural) example of G. Matta-Clark and *Anarchitecture* bridges art and architecture, presenting an approach to materiality contrasting Modernism.[67] In D3, artistic examples from *Minimalism* and *(Post)Minimalism* (R. Morris [fig.5.15], B. Le Va) utilise neutrality and passivity as material qualities to produce (material) objects with a presence 'completely free of references except to itself.'[68]

The different artistic examples reflect an active and intentional use of materials and a diverse attitude towards material qualities relating to the capacity and aim of the use in the specific context.

**66** Monrad, Kasper, Vilhelm Hammershøi, Statens Museum for Kunst, and Hypo-Kulturstiftung, eds. "Hammershøi Og Hjemløsheden." In Hammershøi Og Europa, 184–85. Copenhagen: Statens Museum for Kunst [u.a.], 2012.

**67** Attlee, James. "Towards Anarchitecture: Gordon Matta-Clark and Le Corbusier." Tate Papers, no. 7 (Spring 2007). https://www.tate.org.uk/research/tate-papers/07/towards-anarchitecture-gordon-matta-clark-and-le-corbusier.



[fig.5.15]

**68** Moravánszky, Ákos. "Paths to Matter." In Metamorphism: Material Change in Architecture, 56, 2018.

## *Introductory paragraph:*

## *Demonstration 1–3*

The following chapters present the three Demonstrations (1-3). Each Demonstration follows its own logic and is developed by staying close to the material. However, they relate and present particular perspectives of material weakness.

All three Demonstrations are concerned with material instability and vibrancy, transitional material conditions and performative material dimensions. *Demonstration 1* investigates performative material relations centred around material instabilities. *Demonstration 2* investigates mechanical material relations, where the gap as a condition is central to this performance. *Demonstration 3* departs from a similar point as D2, where the material example also concerns mechanical performative capacities (of wood and gaps) – however, the focus of this Demonstration takes another direction. The investigations centre around material processes and -systems.

There has been a continual exchange across the different Demonstrations, but at the same time, the structure of the first Demonstration informs the next. As the first Demonstration (D1) was the first to reach a concluding state, it has a particular role in the specific organisation and format of a Demonstration. This contribution has furthermore informed the direction of the two other Demonstrations on an overall thematic level.

The research investigates how a weak material approach works with material processes and forces. Similarly, the research method reflects this process-oriented focus. The Measurings initiates an open and explorative approach, where the set-up of the investigations was established with intentions. However, sometimes it gave other insights than expected. Nevertheless, in some cases, these unexpected dimensions opened up a field of potential, leading to discovering similar dimensions within

the other Demonstrations and thus altering the direction of the research.

Although the three Demonstrations presented in this dissertation might appear completed and in a concluded state, they are still regarded as partly open and porous. Hence, the research could be built further upon or initiate new Demonstrations.

## *Demonstration 1*

## *Demonstration 1*

[fig.6.1]

This Demonstration departs from observations of material arrangements where a sacrificial part has a vital role. Material investigations establish a particular view of lime (calcium compounds), which, together with theories and artistic examples, seek to discuss material transitions and performative material relations.

***weak, sacrificial parts***

The investigation starts with observations of material arrangements, often referred to through a denotation of *sacrifice.* The examples describe a relation of materials where one gives itself to the other. An example from marine vessels is the galvanic anode that acts as a sacrificial component.[1] The anode protects (submerged) metal components of more value (more expensive metal parts) from corrosion. As the anode is made of a metal alloy – often zinc – with a more 'active' voltage, the difference in potential causes the anode material to corrode in preference to the more noble metals. The formal geometry of the anode is worn away while the material performs. During a season, the anode is worn out and replaced. [fig.6.1]

**1** Eyres, David J., and G. J. Bruce. "27 - Corrosion Control and Antifouling Systems." In Ship Construction, Seventh edition., 327–43. Amsterdam, [Netherlands]: Butterworth-Heinemann, 2012.

[fig.6.2]

Similarly, the traditional material technique of parge coat acts as a sacrificial layer. Due to its chemical composition and physical porosity, lime is relatively unstable and vulnerable to moisture. These properties are utilised in the weak sacrificial layer of the parge coat, which protects the masonry wall from rising capillary water.[2] The water is directed upwards and outwards to the exterior lime layer through a capillary effect in the pore structure. Salt accumulates in this layer instead of causing damage to the foundation masonry wall, and over time, lime degenerates in favour of the bricks.[3] [fig.6.2] Whereas parge coat is a traditional material technique typical in a

**2** Søren Vadstrup, "Information Om Bygningsbevaring: Kalkning" (Kultur Styrelsen, 2016),

*Note:* Used on masonary buildings from before approx. 1900, which are constructed with brick foundations without moisture membranes. Today replaced with vapour barriers, as polyethene sheeting.

Danish context, similarly – in Venice – lime plaster acts as a sacrificial film on external surfaces to protect from atmospheric degradation.[4] In both cases, the material instability of lime (in relation to moisture) is embraced as the damage is limited to the sacrificial layer, which is easily replaced. The changes occur slowly, and visible signs on the surface give hints of when the layer needs to be replaced.

***index of hidden forces and movements***

The notion of sacrifice is a metaphor which comes from the legacy of *alchemy* – a medieval forerunner of chemistry, involving material processes and transmutations of matter into another form. S Walker describes how alchemists were seeking to attain control over the process by seeing a potential of nature not simply to change – but given favorable circumstances – to develop or mature.[5] It was this aspect of maturation that the alchemists sought to control.

The alchemical reference brings emphasis to the performative dimensions of material change, and how the pre-modern approached material changes as something which give presence to invisible forces and movements. In *The Nightmare of Condensation,* J. Foote and C. Dayer examine the architectural potential of condensation, expressing the 'remarkable qualities hidden in saturated air.'[6] [fig.6.3] Foote and Dayer give a historical tracing of the phenomena from alchemy up until today and describe how condensation – in the pre-modern mind –

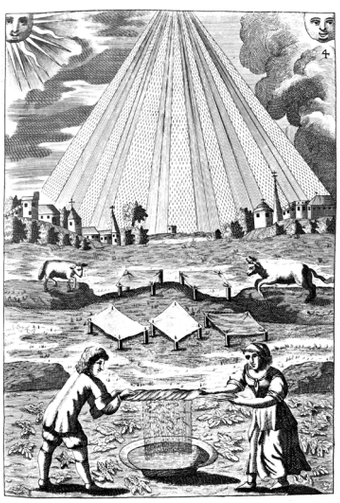
> '[...] was not simply the conversion of vapor or gas into its liquid state. Rather, it was a key indicator of the hidden world of material movements and interaction.'[7]

Similarly, the material changes (of the two described examples) could be perceived as an *index* of a hidden world of material movements and interactions (the hidden is made visible through materials). Thus, the example of the zinc anode becomes a measuring device of water conditions (the content of salt, streams and movements). In the same way, the lime layer of parge coat makes visible hidden underground conditions and

**3** Bak-Andersen, Søren. "Vedvarende holdbarhed." In Gammel viden til nye bygninger: Traditionelle byggematerialer og håndværksteknik i nutidigt byggeri, 59. København: KADK, 2020.

**4** Piana, Mario. "Accorgimenti Costruttivi e Sistemi Statici Dell'architettura Veneziana." In Dietro i Palazzi: Tre Secoli Di Architettura Minore a Venezia, 1492-1803, 33–37. Catalogo Della Mostra. Venezia: Arsenale, 1984.

**5** Walker, Stephen. "Gordon Matta-Clark: Matter, Materiality, Entropy, Alchemy." In Material Matters: Architecture and Material Practice, 51. London ; New York: Routledge, 2007.



[fig.6.3]

**6** Jonathan Foote and Carolina Dayer, "The Nightmare of Condensation," in Ceilings and Dreams: The Architecture of Levity (London ; New York: Routledge, 2020), 159.

**7** Ibid.

forces of rising moisture.

The research seeks to move beyond the aspect of sacrifice as merely a loss. The example of the sacrificial anode and the parge coat, where a material degenerates in favour of others, is comprehended as a *performative material relation;* between zinc and noble metals – between lime and bricks.

[fig.6.4]

***MEASURINGS:***
*'The Dramaturgy of Lime'*

The Measurings departs from this performative and process-oriented focus of materials. To gain insights from a material point of view, the Measurings establishes a closer look at *lime (calcium compounds).*

Lime is a material deeply embedded into our building culture, dating back to the Roman period. The (chemical) processing of the material before it becomes a material for architecture (lime cycle),[8] involves different material processes and conditions; from solid, to liquid, to powder – embedding different material tempi. Through a process of burning, quarried lime stone is turned into quicklime. [fig.6.4] The adding of heat releases carbon-oxide, which makes the quicklime into an unstable material condition – if exposed to water or air the reaction is instant. During slaking, when adding water, heat is released, and quicklime is tuned into hydrated lime (calcium hydroxide). This process of slaking is a slow process where the material needs to mature. Saturating the hydrated lime with water, produces lime milk or lime water for building use as surface coating. The hydrated lime in any material form reacts with air and undergoes a process of carbonation, where carbon-oxide is bound to the material.

**8** Van Balen, Koenraad. "Understanding the Lime Cycle and Its Influence on Historical Construction Practice." In Proceedings of the First International Congress on Construction History, 2043. Madrid, 2003.

[fig.6.5]

Within this research, lime initially captured the attention as a sacrificial layer. However, there are also other examples where the porous material condition of lime enables it to takes on a

‘weak’ role in relation to other materials. Traditionally, bricks have been used in pair with lime mortar. Due to porosity, the lime mortar can be considered weaker than the bricks. Under the tension of unstable ground the mortar absorbs forces, allowing a slight displacement of the individual stone – thereby protecting the bricks. [fig. 6.5] Minor cracks of the lime mortar are self-healing (due to the continuous crystallisation process of lime), while more severe damage is limited to the joint. (Conversely, the more resistant cement mortar favoured in recent decades, causes the bricks to break instead).[9] Similarly, in Venice, the lime binder of the terrazzo floors are ‘weakened’[10] to reduce the persistence/tenacity. This weakening of the binder increases the adaptive plastic capacity of the surface – and thus accommodating deformations of unstable soils and absorbing the contraction and expansion cycles induced by continuous temperature changes. The terminology connected to lime underlines the vitality of the material. In Italian, the word for quick lime is *calce viva* – which translates into *‘lime alive’.* Whereas, the seasoning/maturing operation involved in the ‘weakening’ of the terrazzo binder is called by the Venetian workers *masir,* which means ‘still alive’.[11]

These (relatively) unstable material conditions of lime makes it an optimal material for investigations which seek to initiate and explore material performance and effects. Thus, the investigations seek to utilise the material instability as performative capacities. The Measurings establishes an open and explorative framework with defamiliarising capacities, which seek to move the material from a practical realm and establish an attentive gaze attentive to performative and experiential dimensions. Thus, the Measurings establishes an aesthetical and poetic framing of a material which are usually technically described.

The Measurings explores the material as a process through a spatial installation and a video work.[12]

*spatial installation*

The spatial installation consists of a large steel pool (black, d: 80 cm) containing 35 litres of *lime water (Ca(OH)2).* [fig.6.6,6.7]

**9** Anders Nielsen, “Længe Leve Kalkmørtlen,” Tidsskriftet Tegl, no. 1 (2013): 30–33.

**10** Piana, Mario. “Non si vede cosa, per suoli, ne più bella ne più gentile, ne più durabile di questa.” I terrazzi e l’edilizia veneziana.” In I pavimenti alla veneziana: riporta le relazioni presentate al Convegno di Studio I Pavimenti alla Veneziana (Venezia, 27 maggio 2005), edited by Lorenzo Lazzarini, 77. Verona: Cierre, 2008.

Note: Translation from Italian.

*‘A ben vedere gran parte delle operazioni dedicate alla formazione del terrazzo è indirizzata a sottrarre capacità di presa alla calce. L’indebolimento del legante si genera fin dal momento di preparazione dell’impasto [...].’*

**11** Ibid., Piana.

**12** Contribution at Works+Words 2019, Biennale in Artistic Research in Architecture (Royal Danish Academy, Copenhagen).

Video work as digital appendix, described in *Inventory*.

[fig.6.6]

[fig.6.7, 6.8]

The set-up provides a horizontal view of a material, usually applied as thin layers on vertical surfaces. The material – in a liquid state – is contained within the pool. This operation of containment derives from an incident of spilling lime water and an observation of how the splash – seemingly clear as water – (magically) turns into white stains. The spatial installation and containment of lime water gives a depth and an extent of the material, which renders visible infinitesimal variants of material differences which is difficult to perceive under 'normal' circumstances when applied as a thin layer.[7] [fig.6.8] This set-up of a a formal geometry and unstable material condition, establishes a friction between two different possible notions of *form* – which is used operative as a device for measuring material performance.

In the late 1960's, the post-minimal artist R. Morris initiated the concept of *anti form.* Morris's concept – which relies upon a geometrical understanding of form – were developed as 'an opposition to geometric, predominantly rectangular forms in Minimal and Object art.'[13] 'Anti-form' sculptors – as Morris – worked from a principle that form should derive from 'the inherent qualities of the chosen material'.[14] This principle contrasted earlier minimalist sculptors which took on a more formal approach to materials; imposing 'order on their materials and confined themselves to fixed geometrical shapes and structures.'[15] According to Morris, in object-type art, all non-rigid materials are thrown out and 'process is not visible.'[16] The artist and theorist A. Kaprow responds to this critique, by dissolving Morris's strict dichotomy of the formal (geometrical) and *non form.* According to Kaprow non form is a condition impossible to observe, as:

> '[t]he structure of the cerebral cortex and all our biological functions permit us only patterned responses and thoughts of one kind or another. For cultural and personal reasons, we may prefer this pattern to that one—say a pile of shit to a series of cubes—but they are equally "formal," equally analyzable.'[17]

Using Morris's art work *'Untitled'* (1967-68) comprised of a pile of felt batting as an example [fig.6.9], Kaprow presents a

**13** Morris, Robert. "Anti Form." Artforum, April 1968.

**14** Tate. "Anti-Form." Art Museum, n.d. Accessed March 8, 2023.

**15** Ibid., Tate.

**16** Ibid., Morris.

*index card:* ***form***

**17** Allan Kaprow, "The Shape of the Art Environment: How Anti Form Is 'Anti Form'?," Artforum, 1968.

[fig.6.9]

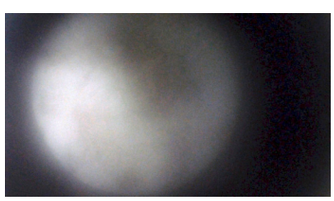
*relational* perspective of form:

> 'Morris's new work [...] was made in a rectangular studio, to be shown in a rectangular gallery, reproduced in a rectangular magazine, in rectangular photographs, all aligned according to rectangular axes, for rectangular reading movements and rectangular thought patterns. [the work] function strictly in contrast to, or now and then in conflict with, their enframing spaces. Ruled lines and measurable corners in such spaces tell us how far, how big, how soft, how atmospheric, indeed, how "amorphous" an art work is within these lines and corners. Rectilinearity, by definition, is relational; and so long as we live in a world dominated by this and other part-to-whole geometrical figures, we cannot talk about anti form or non form *except as one type of form in relation to another (rectilinear) type.*'[18]

**18** Ibid., Kaprow,

**19** An afterthought: As an industrial product, the formal appearance of lime already has a connection to the circular geometry through its containment (storing) in buckets.

Kaprow's relational perspective of form shed light on the relation the Measurings establishes, which plays on the contrast between a formal geometry (pool) and the 'formless', dynamic and structurally unstable (lime water). As a liquid condition, the lime water needs to be contained within a structurally stable form to be observable. But furthermore, material changes of the lime water becomes more visible in contrast to a material (steel) that does not undergo rapid changes and thus is more stable in contact with the forces. The pool – which spatially contains the material – acts as a formal framework which contrasts the ephemeral and dynamic liquid, and thus operates as a measuring device of the formless dimensions of lime water.[19]

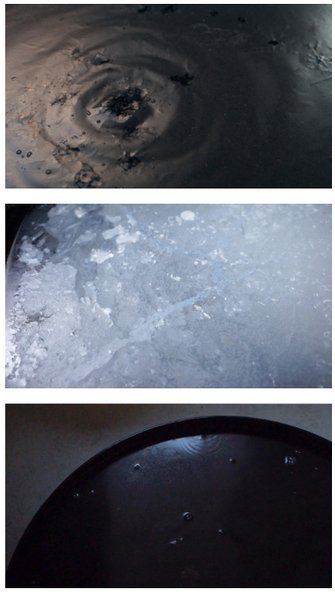


[fig.6.10 - 6.12]

*video work*

The video work is organised as six sequences (composed of several film clips) which explores different material conditions of lime [fig.6.10-6.15]. Various forms of the material (quicklime, lime milk, and lime water) are activated through actions as filling, pouring, stirring, dripping and rocking – which, through contact with forces (as water, air, gravity), create performative effects. The camera frame is fixed, and the material moves.

*First, (1) filling a metal container with pieces of quicklime (CaO). Then, the act of (2) pouring water (H2O). As quick lime is incredibly unstable in contact with water, this serves as an act of provocation. The reaction is instant. Starting as an aggressive hissing, emission of heat is immediately materialised as condensation on the camera lens. (3) Stirring the liquid of lime milk. Gravity settling the particles. (4) Ladling limewater (Ca(OH)2) into the empty pool. The crystallisation process immediately starts when exposed to air (CO2). First as minor disturbances on the clear surface, then materialised as (what appear to be) a solid crust. (5) Dripping onto and breaking the surface. Followed by (6) rocking the pool. Instantly the lime water re-crystallises and heals its surface – while leaving visible traces of the previous events.*



[fig.6.13 - 6.15]

The video work establishes a close-up view of the material sections, heightening the reality of singled out details. This particular cropping and focus on the micro slows down perception and encourages close attention. D. Ades describes this technique of the close-up as an

> 'endless unfolding of new worlds through progressive magnification of little things.'[20]

According to R. Krauss, photographic cropping indicates a break or a rupture in the 'continuous fabric of reality.'[21] The video work follows the material flow, while creating "cuts in the flow" to slow down perception and establish a closer look at particular material moments. The particular investigational set-up is an equivalent to what K. Steward calls a *scene,* where the set-up of the Measurings becomes an active and integral part of the material relations and performative effects.[22] [fig.6.16] The metal bucket – containing the quick lime – were chosen for the materials ability to resist heat. However, the circular geometry – combined with the material properties – (unintentionally) gives an amplified sound effect which accentuates the sonic dimensions of the material performance. The camera lens, which passively observes the (chemical) reaction from adding water, also becomes an active part; as heat and vapour moves,

**20** Dawn Ades, "Little Things: Close-up in Photo and Film 1839-1963," in Close-up: Proximity and Defamiliarisation in Art, Film and Photography (Edinburgh: Fruitmarket Gallery, 2008), 44.

**21** Rosalind E. Krauss, "Photographic Conditions of Surrealism," in The Originality of the Avant-Garde and Other Modernist Myths, 12. print (Cambridge, Mass.: The MIT Press, 1985), 115.

**22** Stewart, Kathleen. "Weak Theory in an Unfinished World." Journal of Folklore Research 45, no. 1 (2008): 73.

[fig.6.16]

and materialises as condensation on the lens. Thus, the condensation of the camera lens becomes an index of forces of heat and water, materialising – in Stewart's terms; a 'poesis of a something snapping into place.'[23]

The sequences of the video work unfolds a material dramaturgy which follows the 'lime-cycle'. The role of heat, water and air in the preparation and the use of lime, similarly acts as drivers of material effects within the Measurings. A transcript of the material dramaturgy of the video work could be made through chemical equations denoting the different material states; from quicklime (CaO) – to lime milk and lime water ($Ca(OH)_2$) – to carbonation ($CaCO_3$). However, the video work focuses attention towards the transition *between* the different material states, taking place within the gaps between the symbols and lines of the equations. M. Duchamp's notion of *inframince* (or infrathin) could be used to unfold these gaps as liminal situations. [fig.6.17] The concept describes small nuances of material perception, with a sensitivity to difference and transition between material states. An example of inframince which Duchamps uses, is

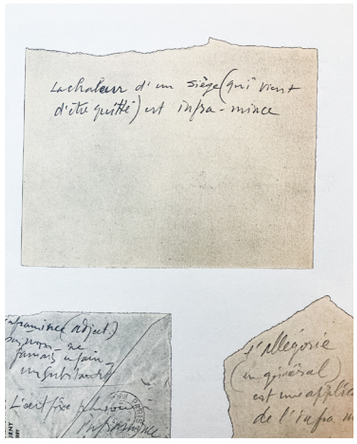
'the warmth of a seat (which has just been left'[24]

Through this material phenomena, the presence of person lingers as a slow shadow. The example describes temporal displacements of phenomena, which could be comprehended as a material delay or reverberation.

**23** Ibid.

*index card:* ***inframince***

**24** Marcel Duchamp, "Inframince, Note 4," in Marcel Duchamp, Notes, trans. Paul Matisse (Paris: Centre National d'Art et de Culture Georges Pompidou, 1980).



[fig.6.17]

***performative dimensions of instability***

The video work investigates the material as a dramatic composition – a material dramaturgy – where the instability of lime embeds experiential and aesthetic qualities and temporal dimensions. These insights were brought into a dialogue with artistic examples from *process art* that takes advantage of material instability as aesthetic and performative drivers of change. The Measurings establishes a dialogue with artistic examples of Richard Serra and Joseph Beuys, demonstrating an active use of material instability and relations.

In his early works, Richard Serra intentionally worked with materials that possess a potential loss. *Gutter Corner Splash: Night Shift* (1963/2018) uses the gallery space as a container to cast lead. [fig.6.18] The work utilises that lead is more unstable than the corner gutter in contact with high temperatures. When heated, the lead undergoes a material transformation from solid to liquid and embodies a simultaneity of scattering and containment – two material extremes.[25] The lead is formed by the spatial delimitation, converting the juncture into a kind of mould. The casts are then pried from the wall and displayed in the room where they were made. As lead is structurally unstable and fails to hold a static form over time, the artwork continues to develop and change after the act of creation. Thus, lead could be considered 'weak' in this context because of the formal performance it has been put into. [fig.6.19]

[fig.6.18, 6.19]

Joseph Beuys' artwork *Fat Battery* (1963) is composed of sculptural units of various materials with degenerating potentials. A cardboard box acts as a spatial demarcation for several tin casings containing fat. Each casing is linked with strips of felt. [fig.6.20] Over time, the work has undergone significant changes. The fat has transformed from semi-solid to liquid form, flowing from its initial position and soaking into the surrounding elements of felt and corroded the metal. The most intriguing change within this research context, is of the cardboard box. The material is a paper product, which over time, becomes increasingly acidic and brittle and eventually loses its structural stability. However, the infiltration of fat has sealed the structure of the card – fortuitously preventing it from degrading and collapsing over time.[26] [fig.6.21]

**25** Jeffrey Weiss, "Due Process: Richard Serra's Early Splash / Cast Works," Artforum, November 2015.

**26** Rachel Barker and Alison Bracker, "Beuys Is Dead: Long Live Beuys! Characterising Volition, Longevity, and Decision-Making in the Work of Joseph Beuys," Tate Papers, no. 4 (Autumn 2005)

[fig.6.20]

In these artistic examples, the most unstable material affects the other (more stable) material, but at the same time, the latter sets some physical restrictions or framework for the first. In Beuys' *Fat Battery,* it is particularly visible how the temporal delay in time between the instability of materials is productive. Both fat and cardboard are unstable to temperature changes, but as fat is the most unstable of the two and the changes happen faster – it allows the fat to act on the cardboard before it becomes brittle. A similar material delay is involved in the

[fig, 6.21]

relation between the sacrificial part and the part that it protects, within the examples of parge coat/bricks and zinc anode/noble metals. Thus, the different degrees of instability in relation to the forces exposes a temporal gap – a scope for intervening.

***material instability and (architectural) form***

The Demonstration presents a perspective of how unstable material capacities/formless dimensions are operative within overall material systems. The investigation is initiated by a relation of materials where one gives itself to the other. This sacrificial role within material systems is performed by 'active', unstable materials (in that particular context) – dynamic material properties which connect to a dimension of formless.

*index card:* ***base materialism***

Bataille's notion of *base matter* gives insights which can be used to discuss the sacrificial role and unstable (formless) materials dimensions within material systems. The concept of base matter served as a critique of the hierarchy in materialism, promoting materiality in a non-idealised form:

> "Most materialists...have situated dead matter at the summit of a conventional hierarchy of diverse types of facts, without realizing that in this way they have submitted to an obsession with an *ideal* form of matter, with a form that approaches closer than any other to that which matter *should* be."[27]

**27** Bataille, Georges. "Materialism." In Encyclopaedia Acephalica, edited by Alastair Brotchie, translated by John Harman, 58. London: Atlas Press, 1995.

**28** Tom Nielsen, "Overskudslandskaber," Nordisk Arkitekturforskning, 2001.

Note: Translation from Danish: *'Georges Batailles tanke er en 'anti-idealisme', der peger på hvordan den materielle verden altid vil modsige og modarbejde 'ideal-verdenen'.'*

[fig.6.22]

Base materialism turns attention to how the material world contradicts and opposes the 'ideal world.'[28] Within an architectural context, material degeneration is usually regarded in negative terms. In the case of the parge coat as a sacrificial layer, the material takes a role within the overall system that disturbs the usual material attitude/hierarchy. [fig.6.22] Thus, one could argue that the essential role of this layer – in a greater perspective of an overall material system – disrupts a traditional material hierarchy which operates from low to high, as the building as a whole is dependent on the parge coats as an 'active flux matter'[29] with degenerating capacities.

The investigations give insights into how the relationship

between degrees of instabilities can direct material changes within overall material systems. With these insights, the research has searched for theories that establish a relation between form and instability, thus opening up alternative understandings of form that expand beyond formal control. G. Harman presents a theoretical perspective that positions formless as an attribute/dimension of form – distinguishing between degrees of material instability and -organisation. Harman states:

> '[...] there is no such thing as formless matter, but you are still interested in being able to distinguish between more and less organized forms as well as more and less stable forms.'[30]

Harman's differentiation of various degrees of material instabilities and organisation within the notion of form connects with Kaprow's distinguishing between *'one type of form in relation to another (rectilinear) type.'*[31] Thus, in this perspective, the formal geometrical and the formless could be considered constituent and equal parts of the overall form – constituting different degrees of instabilities, organisation, permanences and temporalities. Similarly, H. Bergson presents a process-oriented understanding of form, which embeds temporal dimensions. The notion of form is translated by 'view' or 'moment'. According to Bergson, 'eidos' or form is

> '[...] the stable view taken of the instability of things'[32]

Bergson's notion of form takes into account the instability of a dynamic world in movement, implicating that subsequent (and former) material variations of the form are equally adequate. Thus, this notion of form removes conceptions of one ideal material state/form. Bringing these perspectives into an architectural discussion initiates a composite understanding of form, where the formless and the formal are considered integral parts of the material system. Within this perspective, the research identifies potential in developing architecture as part of an overall material system, focusing on relations between degrees of material instability and forces – considering temporal dimensions and future material changes as an integral part of the architectural work/form.

**29** Benjamin Noys, "Georges Bataille's Base Materialism," Cultural Values 2, no. 4 (October 1998): 499–500.

*index card:* ***formless***

**30** Harman, Graham. "Realism and Materialism." In The Rise of Realism, by Manuel De Landa and Graham Harman, 22. Cambridge, UK: Polity, 2017.

*index card:* ***form***

**31** Ibid., Kaprow.

**32** Bergson, Henri. "Plato and Aristotle." In Creative Evolution, translated by Arthur Mitchell, 315. New York: Henry Holt and Company, 1911.

## *Demonstration 2*

## *Demonstration 2*

This Demonstration investigates mechanical material relations, with a focus on in-between gaps which can absorb dimensional material changes. The research is initiated by a particular view of a traditional wood panel door as a material system, which relies on invisible gaps between the loose panel and the frame *(panel float)* to function. Material investigations change the perspective from the physical object to the void, seeking to unfold and discuss the gaps as performative spatial conditions.

[fig.7.1]

***ornamentation and material movement***

In a Danish context, the panel door is an everyday architectural element that is so familiar that we hardly question it. Vilhelm Hammershøi's paintings from *Strandgade 30* depict a typical Copenhagen apartment from around 1890 – but could just as well be an interior captured from a home of the present time. [fig.7.1, 7.2] Within these sparsely furnished interior views, the white ornamented panel doors are some of the main compositional elements. The rectangular panels were actively used by Hammershøi as a compositional device, capturing ephemeral and subtle light phenomena.[1] A closer look at the interior of Hammershøi's paintings reveals other forms of panelled surfaces and moulding construction – such as wall panels (similar principle as panel door), cornice (between wall and ceiling), skirting board (between wall and floor). These ornamented surfaces, which today are taken as mostly decoration,[2] were in fact rooted in practical concerns. P. Emmons describe traditional ornament as a site of architectural invention, born from the necessity to accommodate material movement.[3]

**1** Vad, Poul. "Stedets Ånd: Strandgade 30." In Hammershøi: værk og liv, 5. udg., 1. opl., 220–22. København: Gyldendal, 2003.

[fig.7.2]

F. Hughes describes how ornamentation traditionally acted as a strategy for negotiation with 'matter in the making of buildings.'[4] According to Hughes, ornamentation was 'a key strategy for

**2** Hughes, Francesca. "Error and Surface." In The Architecture of Error: Matter, Measure, and the Misadventures of Precision, 226. Cambridge, Massachusetts: The MIT Press, 2014.

**3** Emmons, Paul. "Play of Scale." In Drawing Imagining Building: Embodiment in Architectural Design Practices, 197. New York: Routledge, 2019.

concealing error at major low-tolerance junctions'[5] – generously hiding the misalignment of parts. Thus, despite material movements, seemingly fixed appearance/surface conditions were enabled. Lingering further on Hammershøi's apartment, these ornamented surfaces are particularly useful in buildings typical of this period. *Strandgade 30* was one of the earliest houses in the area of Christianshavn from around 1663 – from a combination of a stonehouse and a half-timbered house, built on filled land, and with no gable against the neighbouring building, Strandgade 32.[6] Thus, Hammershøis's panel doors are part of an overall material system that allows movement between various materials and tectonic principles, negotiating an unstable ground and – due to poor insulation – a sensitivity towards seasonal changes. In a sense, Hammershøis's paintings present a static view of an interior which is floating.

**4** Hughes, Francesca. "Error and Surface." In The Architecture of Error: Matter, Measure, and the Misadventures of Precision, 224. Cambridge, Massachusetts: The MIT Press, 2014.

**5** Ibid.

**6** Engqvist, Hans Henrik. "Strandgade 30 Gundens Bebyggelse." In Strandgade 30 En Christianshavnsk Gaards Historie Gennem 300 Aar, 18. København: Henry L. W. Jensen, 1945.

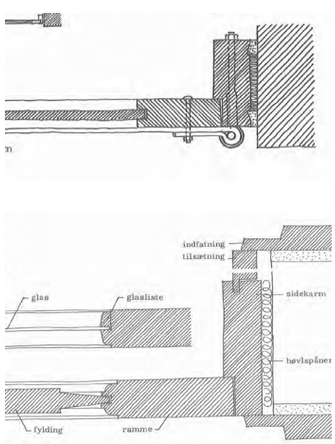
**7** Elisæus Janus Sommerfeldt, "2. Døre Og Porte," in Forelæsninger over Huusbygningskunsten for Officeerskolens Ingenieurafdeling, II. Bygningsdele (Kjøbenhavn: C.A. Reitzels Forlag, 1879), 130.

**8** Oxford Dictionary English: *'play'*

### *the panel door and interiority*

A particular view is established by zooming further in – from the interior of the apartment and the ornamented surfaces – to the interiority of the door itself. By establishing a closer look at the panel door beyond the ornamented surface, a more complex comprehension of the door is unfolded.

In a traditional panel door – and other forms of panneled surfaces – the panels are not completely fixed within the frame.[7] A *dimensional left-over* between the panel and the frame (panel float) gives space for horizontal movement and potential changes of dimensions of the panels. The contraction and expansion of the wood – generated by humidity and temperature changes – are absorbed in these gaps, located between the tongue (panel) and groove (frame). This relation between the panel and the frame can be comprehended through the traditional idea of *play.* Play is a performative and spatial term which describes mechanical performance: 'the space in or through which a mechanism can or does move'.[8] Emmons – which uses the panel door as an example designed to accommodate play – positions the term as a counterpart to today's use of the concept of tolerance in building construction:




[fig.7.3, 7.4]

'Before tolerance, architects designed for play, or

> elbow room. [...] Play describes space available for free movement.[...] Play is the acceptance of the need to allow for free action.'[9]

The notion of play highlights the performative (mechanical) relation between the panel and the frame of the door – between the material and the (hidden) gaps.

The gaps within the panel door could be characterised as intangible in a twofold sense. In a direct, physical way by being visually hidden – but moreover, by originating from tacit material insights belonging to artisan knowledge. As a construction principle from traditional wood craft, visual descriptions are reduced to schematic sectional drawings where fixed lines demarcate and position the gaps in-between the hatched areas. [fig.7.3, 7.4] Theoretical descriptions of the concept of play, present metaphorical and spatial interpretations, such as Emmons' *elbow room* or M. Frascari's description of play as a *dimensional agreement* (among the building elements).[10] Intrigued by the imaginary dimensions these vague descriptions initiate, the investigations seek to give the gaps spatial presence and unfold them as spatial conditions.

**9** Emmons, Paul. "Play of Scale." In Drawing Imagining Building: Embodiment in Architectural Design Practices, 197. New York: Routledge, 2019.

**10** Frascari, Marco. "Tolerance or Play: Conventional Criticism or Critical Conventionalism in Light of the Italian Retreat from the Modern Movement." Midgård Journal of Architectural Theory and Criticism 1, no. 1 (1987): 7–10.

***MEASURINGS:***
*'Panel Doors: Interior Visions'*

The Measurings consist of a photo series titled *'Panel Doors: Interior Visions' (49 x 35 cm)*, performed with the aid of an endoscopic camera. The endoscopic images present interior views of the in-between gaps of a traditional panel door and capture snapshots of particular moments and spatial conditions emerging from previous material processes performed through the last 100 years.

[fig.7.5]

*sectioning*
Two old panel doors (*Dannebrog*,[11] constructed before 1910)

**11** Note: *Dannebrog* is a classical panel door, characterised by four panels separated by a middle beam (two low panels at the bottom and two high above).

were sectioned,[12] enabling physical access to the gaps hidden within. [fig.7.5] The dissection of the doors are a response to a curiosity to see beyond the external in open and explorative terms. Bachelard describes how the 'will to look inside things makes vision *piercing* and *penetrating*.'[13] This is an aggressive curiosity that inspects – opposite a passive curiosity waiting for 'surprising sights to come along'.[14] According to Bachelard, the desire to look inside things detects

> '[...] the crevices, clefts, and cracks through which we can *violate the secret* of hidden things. [...] the psychological forces in action here are aiming to get away from all that is external in order to see *something* else, to see beyond and within, to escape, in short, the passivity of vision.'[15]

The act of cutting is performative and can be perceived in the light of the Surrealists photographic technique of spacing, which in this case acts as *physical cropping.* Thus, the manipulation of the material object goes beyond framing with a camera: With a jigsaw, the elements of investigation is cut 'out of reality at large'[16] – physically creating a break in the sequence of the continuous gap running vertically along the panels. The cut disturbs and manipulates the door into (material) sections, creating a new reality to explore as situated perspectives.

*endoscopic survey*

The sectional cuts reveal gaps of various sizes created by the movement of the panels. An endoscopic camera *(ø5mm)* is used as a device for making them visual accessible – simultaneously inhabiting and capturing the gaps. [fig.7.6] This transfer from a physical object of (a section of) a door into images, leads to a distortion of orientation and scale. The gaps – which have a vertical direction within a functional door – are rotated into horizontal picture planes. This operation disconnects the images from the everyday object of a door and promotes a scaleless, spatial reading. Thus, the Measurings capture a space that is physically there but which is not visually accessible in a functional, non-dissected door. In this sense, the photographic work presents a distorted and uncanny reality –

**12** *Note:*
The sectioned doors are also used as a basis for sectional drawings. The drawings depict the technical principle of the panel door as a material system. These drawings appear as separate appendixes described in *Inventory* and are part of discussions in the chapter *Discussions across Demonstrations.*

*index card:* ***vision***

**13** Bachelard, Gaston. "Reveries of Material Interiority." In Earth and Reveries of Repose: An Essay on Images of Interiority, 5. Dallas, Texas: Dallas Inst. of Humanities and Culture, 2011.

**14** Ibid., Bachelard.

**15** Ibid.

*index card:* ***spacing***

**16** Krauss, Rosalind E. "Photographic Conditions of Surrealism." In The Originality of the Avant-Garde and Other Modernist Myths, 12. print., 115. Cambridge, Mass.: The MIT Press, 1985.

[fig.7.6]

**17** Baker, Simon. "Watch out for Life: The Conceptual Close-up 1920-2006." In Close-up: Proximity and Defamiliarisation in Art, Film and Photography, 96. Edinburgh: Fruitmarket Gallery, 2008.

mining a 'fertile seam of proximity, familiarity, discomfort.'[17]

Although the camera is often regarded as being passive,[18] R. Krauss describes camera-seeing as an extraordinary extension of human eyesight, which actively mediates and shapes reality:

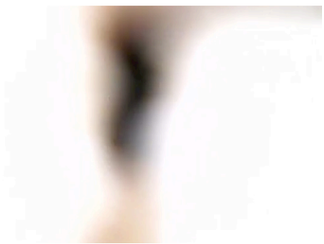
> '[...] in increasing the ways in which the world can be present to vision, the camera mediates that presence, gets between the viewer and the world, shapes reality according to *its* terms. Thus what supplements and enlarges human vision also supplants the viewer himself; the camera is the aid who comes to usurp.'[19]

In the same way, the camera optics of the endoscopic device affect the output of the images. As the endoscope inhabits the gap its captures, the photographic situation gives an extremely close-up view – determining the particular framing and photographic cropping. Due to the logic of camera optics the plane of focus increases at close distance, leaving much visual information out of focus. Furthermore, the primitive lens has a limited resolution and six simple LED lights at the end of the camera gives rudimentary light conditions. The photographs captured by the endoscope are blurred – giving *visual hints* rather than full descriptions. Thereby, the photographic work conveys a visual world that builds further upon the vague, imaginary dimensions that initiated the Measurings. [fig.7.7–7.9]

The intention of the Measurings goes beyond producing accurate, factual representations. In the photographs, the solid – which encloses and defines the gaps – almost becomes absent and is not recognisable as a material (wood). This change of perspective turns attention toward the material presence and potentiality of the gap itself. Furthermore, it moves the particularity of the gaps into a higher degree of abstraction, nurturing dialogue with theoretical concepts.

***material accumulations***

Because of the inaccessibility of the gap for cleaning or maintenance, the Measurings reveal a hidden, accumulated material backside emerging during the last 100 years. The

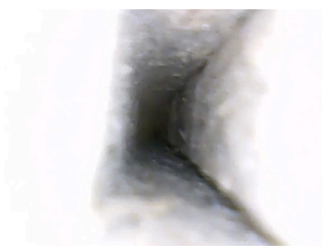


[fig.7.7]

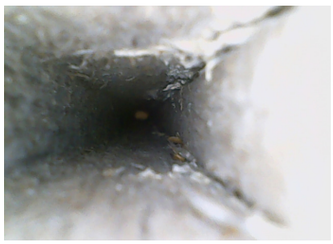
**18** Krauss, Rosalind E, and Jane Livingston. "Preface." In L'amour Fou: Photography & Surrealism : Hayward Gallery, London, July to September 1986, 9. London: Arts Council, 1986.

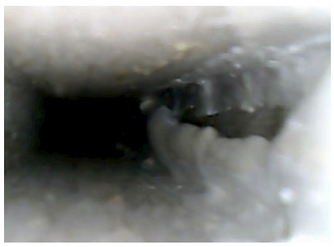
*index card:* ***vision***

**19** Krauss, Rosalind E. "Photographic Conditions of Surrealism." In The Originality of the Avant-Garde and Other Modernist Myths, 12. print., 116. Cambridge, Mass.: The MIT Press, 1985.



[fig.7.8, 7.9]





[fig.7.10, 7.11]

photographic investigations establishes the foundation for exploring the gap within the panel door in open and dynamic terms. Formless material dimensions discovered on the inside are traced and establish a relation to the outside, formal surface.

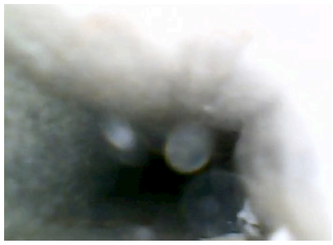
*putty, paint*

Solidified material formations of putty and paint take an almost sculptural character. [fig.7.10, 7.11] These are fluid, gooey materials that embed movement as they leak and migrate easily into gaps – thus, making visible that the boarder between the outside and inside (of the door) is more porous than imagined. Initially applied on the outside surfaces in a liquid or soft state, the putty and paint have moved and permeated within, due to displacements of the panel. Over time, the material state changes into a hardened firm mass inhabiting the gaps.

There is a link between the protracted time of formless material (the time it takes for these leaky materials to move) and the specific time references in the making and maintaining of the door. Thus, the layered materiality of the paint act as stratification of changing material techniques/approaches. Traditionally, putty and paint were based on linseed oil. After application, the fluid material condition undergoes a slow (chemical) process of *hardening* – solidifying into a firm mass or layer. Paint based on linseed oil gives a flexible and diffusion-open surface layer, enabling the wood to “breathe” and move.[20] The protracted time of the hardening process directly connects to the material properties of the layer as resistance, flexibility and adhesion. Conversely, the most recent layers of paint on the door are plastic- or acrylic-based paint, which undergoes a (faster) process of *drying.* When the water in the paint evaporates, the paint film remains as a (more) rigid plastic membrane, vulnerable to material movements.[21]

**20** Vadstrup, Søren, Center for Bygningsbevaring. “Malematerialer II - Heldækkende Malingstyper Til Ældre

**21** Vadstrup, Søren. “Maling På Træ Med Linoljemaling.” Center for bygningsbevaring i Raadvad, 2010.



[fig.7.12]

*dust*

Ephemeral particles of debris and dust occupying the interior of the gaps is kicked up – and captured – by the endoscopic

camera. [fig.7.12, 7.13] Due to gravity, these particles discloses the vertical orientation of the gaps.

J. Amato describes how dust – before 'the first microscopic perceptions of reality'[22] – 'constituted the finest thing the human eye could see. In the form gold dust or pollen, as light filaments that covered the skin, or as individual particles that spun in the sunlight.'[23] [fig.7.14] As Amato poetically expresses, dust 'belongs as much to air as to earth.'[24] Similarly, Stoppani describes how particles in circulation create a mutual exchange between dust and its place:

> 'Dust travels. […] It collects and incorporates particles of different origin, bearing traces of its movements and whereabouts in - rather than on - itself, by exchanging parts of itself with its environment(s).'[25]

The Measurings expose dust particles accumulated over a century. Like photography, dust is an index – where 'its trace is of duration.'[26] However, the origin of these accumulated particles remains to be speculated. As dust results from the divisibility of matter, its source is everything.[27] Although dust – through coating and corrosion of the materials – is 'an unwanted and yet inevitable component of architecture,'[28] Stoppani points out that, in fact, dust partly originates from the materials of architecture – through their weathering, wearing and ruination; 'from fragments, to debris, to powder.'[29]

What seems to be larger particles of sawdust on the endoscopic photographs might originate from the construction of the door 100 years ago or the dissection performed as part of the investigation. Thus, it signifies the particular material processes and exemplifies the role of dust as a measure of our work with things.[30] Other possible sources of the material particles within the gap might emerge from (continuous) movements (abrasion) between contact areas of the tongue (of the panel) and the groove (of the frame). Furthermore – similar to the accumulated putty and paint – some dust particles are likely to originate from outside the frame, showing that a material system imaged as closed has a porosity. All these possible sources work in the imagination by referencing possible material origins.

[fig.7.13]

*index card:* ***dust***

**22** Amato, Joseph Anthony. "Little Things Mean a Lot." In Dust: A History of the Small and the Invisible, 1. Berkeley, Calif: University of California Press, 2000.

**23** Ibid.

**24** Ibid.

**25** Stoppani, Teresa. "Dust Revolutions. Dust, Informe, Architecture (Notes for a Reading of Dust in Bataille)." The Journal of Architecture 12, no. 4 (September 2007): 437.

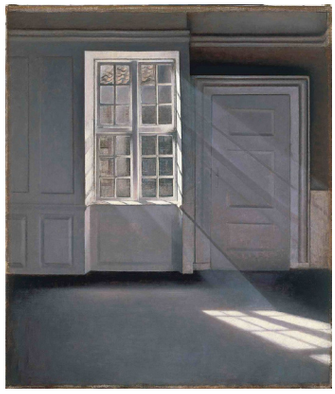
**26** Bois, Yve-Alain and Centre national d'art et de culture Georges Pompidou. "Entropy: Zone." In Formless : A User's Guide, 226. New York: Zone Books, 1997.

**27** Ibid., Amato, 3.

**28** Ibid., Stoppani, 437.

**29** Ibid., Stoppani, 438.

**30** Ibid., Amato, 7.



[fig.7.14]

Dust is often regarded as a trace of neglect – a material irruption associated with decay and entropy. A. Bonnett describes how Modernity's war against dust has been an extensive and strenuous struggle. According to Bonnett – in these new environments – dust must be kept in eternal circulation and prevented from settling. Through the resistance against dust, ornament acquires a new role; as *'dust-traps'*.[31] Thus, it leads to a heightened role of 'surface' in modernity, which can show dust easily and be easily cleaned.

***formless dimensions***

Around the same time Modernity and architectural Modernism endeavour to remove dust from the bourgeois interior and the city streets, Bataille activates it within an architectural discussion as an agent of change.[32] In his entry 'Dust' (*Poussiere*) in the Critical Dictionary, Bataille writes:

> 'The storytellers have not realised that the Sleeping Beauty would have awoken covered in a thick layer of dust; nor have they envisaged the sinister spiders' webs that would have been torn apart at the first movement of her red tresses […].'[33]

Stoppani points out that the crystal coffin in Sleeping Beauty's Palace 'enclosing an embalmed ideal of beauty offers the perfect opportunity to write of a dust which exists and desecrates Architecture but is never seen in architectural representations.'[34] Stoppani states:

> 'Sleeping Beauty collects dust, but nobody before Bataille's exposé has ever wanted to see it.'[35]

According to Stoppani, dust brings 'to architecture that which is difficult to measure, control and represent: its constant change, decay and corruption, or, in other words, time. – what conventional architectural representations do not see.'[36] Thus, dust turns the crystal coffin into an instigator of the *informe* (formless). Placed between the representation of architecture and its edifice, the workings of dust reveal its dynamic and precarious nature:

**31** Bonnett, Alastair. "Dust (1)." In City A-Z, edited by Steve Pile and N. J. Thrift, 62–62. London New York: Routledge, 2000.

**32** Ibid., Stoppani, 438.

**33** Bataille, Georges. "Dust (1929)." In Encyclopaedia Acephalica, edited by Alastair Brotchie, translated by John Harman, 42–43. London: Atlas Press, 1995.

**34** Ibid., Stoppani, 441.

**35** Ibid.

**36** Ibid., 439.

> 'dust occupies and measures the distance between architecture's image and its physical realisation, the non-coincidence of its idea and representation, and construction and inhabitation.'[37]

Similarly, the artworks of artist (and architect) Gordon Matta-Clark establish a material dichotomy between 'the cultured facade' (ideal) and the hidden material inside, which challenges notions of (static) form. In his building dissections, Matta-Clark used buildings and the city as his material.[38] Works such as *Bronx Floor: Threshole* (1972) [fig.7.15] and *Conical Intersect* (1975) [fig.7.16, 7.17] were made by performing building cuts in abandoned buildings. In these works, the performative dimension of the project was just as important as the (short-lived) final pieces. In S. Walker's terms, the building-cuts

> 'exposed the secret, spontaneous and chaotic quality of the alien matter which must have been involved in the object's initial making and which continued to exist behind the apparently uniform, cultured façade of static form expected by established society.'[39]

According to Walker, Matta-Clark's building dissections emanate from a critique of Modernism's valorisation of form, exceeding both the artistic and architectural static object of Modernism. Furthermore, Walker points out how his work

> 'went beyond a contestation of form brought about by the revelation of stuff beneath the surface, where internal material could still be understood to make up, and therefore remain subordinate to, the three dimensions of form.'[40]

Walker describes how Matta-Clark 'drew attention to the enduring insubordination of matter, demonstrating that it never fully submits to the process of making by taking up the 'correct' form and location, and upsetting expectations that it remain inert once 'cultivated'.'[41] With this reading, Walker stresses that the dissection works did not set the cultivated world in opposition to the natural – but maintained them *'in relief against each other'*.[42]

**37** Ibid.

[fig.7.15, 7.16]

**38** Straaten, Laura van. "Revisiting Gordon Matta-Clark's Fusion of Art, Architecture, and Anarchy." New York Magazine, October 30, 2017.

*index card:* ***form***

**39** Walker, Stephen. "Gordon Matta-Clark: Matter, Materiality, Entropy, Alchemy." In Material Matters: Architecture and Material Practice, 49. London ; New York: Routledge, 2007.

**40** Ibid., Walker, 44.

**41** Ibid., 48.

**42** Ibid., 53. *Note:* Made oblique by author.

[fig.7.17]

*index card:* ***formless***

**43** Stoppani, Teresa. "Dust Revolutions. Dust, Informe, Architecture (Notes for a Reading of Dust in Bataille)." The Journal of Architecture 12, no. 4 (September 2007): 443.

Similarly, the dissection and endoscopic investigations of the Measurings establish a perspective which exposes form and the formless in relief – while, at the same time, tying them together and thus unfolding the panel door as a compound/composite material reality. As Stoppani points out,

> 'matter has a form, and it is in the informe that the dynamic dimension of its variation is included.'[43]

The formless-ness of paint, putty and dust within the gap relies on the formal or structured logic of the same materials on the door exterior – which is neatly painted and relatively dust-free. Through the Measurings, the gap is established as a place where the formless resides – an active performative spatial condition, accommodating and acknowledging dynamic material dimensions.

***interior-exterior relations***

*index card:* ***interiority***

**44** Francesca Hughes, "Error and Surface," in The Architecture of Error: Matter, Measure, and the Misadventures of Precision (Cambridge, Massachusetts: The MIT Press, 2014), 226.

The panel door's 'cultivated' outside depends on and derives from the inside (gaps). Thus, the surface operates as 'an external manifestation of the internalized desires.'[44] A reversal of this relation establishes a perspective where the outside becomes a way of reading the inside. Returning to Hammershøi's doors, a complimentary Measuring titled *'Doors of Hammershøi: Surface conditions (130 years after)'* departs from the panel doors in *Strandgade 30* and establishes a closer look at outside surfaces. The Measuring is a photographic investigation of the doors depicted in Hammershøi's paintings in their present material state (2021). [fig.7.18-7.20]

[fig.7.18]

The close-up photographic reading of the panel doors reveals surface conditions of accumulated paint, where the layers of paint persistently applied during the years have become petrified solids. The door starts to act in another way. The fine lines and cracks on the surfaces become traces for reading performances of the material system, acting as indexes of hidden forces, movements and changing spatial conditions. Through these clues on the outside, the invisible condition of the gaps inside the doors becomes materialised. Bachelard's dialectical perspective of the hidden further elaborates upon

this relation between the outside and the inside.[45] The surface bespeaks the depth of the door, rewarding curiosity and nurturing imagination. In Bachelards terms, the traces of the surface envisage 'a perspective of the hidden, a perspective of the interior darkness of matter',[46] giving hints of an invisible – yet vital – interior world.

Hammershøi's paintings establish the panel door as a recognisable material object. The photographic investigation makes use of the contrasts between Hammersøi's iconic doors as a(n ideal) motif and the material reality, which brings with it temporal dimensions and traces of wear. Hence, it brings together perspectives of the panel door as an image or idea and the door as an actual material object, exposing a similar gap as Stoppani refers to between architectural representations and the 'lived object.'[47] These doors of Hammershøi – poetically portrayed in his interior paintings – are, in fact, also dependent upon a messy, disorderly material backside of interior gaps depicted in the endoscopic photographs. [fig.7.21]

[fig.7.19, 7.20]

*index card:* ***interiority***

***architectural perspectives/discussions***

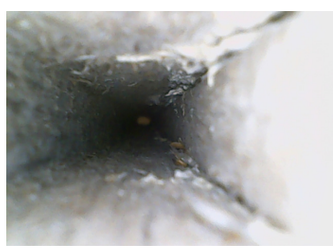
This Demonstration delves into the minor and unfolds a common but operative material detail. Through the Demonstration, the hidden gaps with the traditional panel door are unfolded as an active spatial condition part of more extensive material relations, pointing out that even the invisible and minor have an impact on the overall material system. The investigations unfolds the correlative relation and material porosity between the outside and the inside – between the formal surface and the formless condition of the gap. Thus, the Demonstration shows how the material system of the panel door enables the formal and the formless to be integral parts of the system. The inside accommodates outside environmental forces and processes, and outside cracks on the surface are also part of the overall system and part of experiencing the material object.

These insights contrast more recent versions of the 'panel door' – made of homogeneous materials moulded into a continuous shape.[48] Although the modern version of the door assumes a

**45** Bachelard, Gaston. "Reveries of Material Interiority." In Earth and Reveries of Repose: An Essay on Images of Interiority, 9. Dallas, Texas: Dallas Inst. of Humanities and Culture, 2011.

**46** Ibid., Bachelard, 6.

**47** Ibid., Stoppani, 439.



[fig.7.21]

**48** *Note:*

MDF and chip wood (composite materials of wood fibres in combination with bonding chemicals),

**49** Ibid., Amato, 2.

[fig.7.22, 7.23]

similar outer expression, a dissection of an MDF door reveals an interior disconnected from the exterior – where the logic of the material and material system (relation between parts) is disconnected from the outer appearance/form (shape). [fig.7.22, 7.23] Thus, the formal surface condition emerging from a material system developed to accommodate material instability becomes reduced to decoration. The identity of the panel door transcends its origin as a weak detail and could be read as a symptom of a tendency in contemporary building practice. The Modernist tendency to fight dust similarly favours a seemingly stable, unchanged condition deprived of maintenance or repair. Through the MDF version, the panel door is stripped of performative capacities; thus, there are no places for cracking or moving – no places for material excess or dust.

Through the Measurings, dust activates the gap as a spatial condition and the panel door as a formal surface. Like the microscope (and scientific insights) introduced new realities in the twentieth century and changed the perception of dust, the endoscope enables a glimpse of a hidden material world inside the panel door. However, where the microscope – according to Amato – removed the imaginary dimensions of dust,[49] the endoscopic perceptions of the gap nurture imagination. Through the Measurings, the invisible gap acquires a material presence and is assigned a central role. Re-introducing the gap as a material phenomenon establishes a consciousness which activates a general awareness and questioning of the material inside. Thus, the Demonstration initiates a framework where elusive or hidden material dimensions are given attention and becomes part of architectural material discussions.

## *Demonstration 3*

## *Demonstration 3*

[fig.8.1]

Whereas the two former Demonstrations investigated performative relations between *materials* (D1) and the performative condition of *gaps* (D2), this Demonstration investigates material systems as *field conditions*.

The research is initiated by a particular view of traditional cleft wood shingles, which in this Demonstration is investigated as a weak material process and -system. [fig.8.1] Similar to D2, the material arrangement of cleft shingles is concerned with mechanical material relations. However, in this Demonstration, the focus is on the material system which allow this performance.

Through the notion of field conditions, the Demonstration unfolds relations between process, material, and form. Material investigations are carried out in two modes: First through hands-on construction (tacit knowledge) — followed by geometrical investigations through digital material processes of 3D scanning and 3D print.

***weak material process and -system***

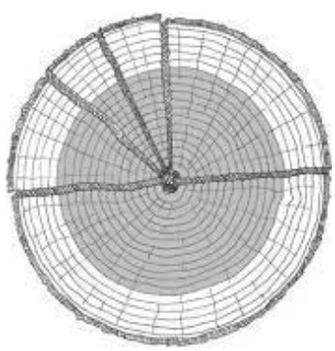
The material technique of cleft wood shingles as cladding has a particular tradition in Norway, Sweden and Finland, where it has demonstrated robustness and life spans of several hundred years.[1] In Norwegian, the term 'tekking' means *'what makes the roof (water) tight'*.[2] As an approach to protection, the cleft wood shingles push the notion of the roof as a barrier to water. Opposite contemporary roof systems with water-tight membranes to keep the water out, the shingles are not *resisting* water — instead, they are designed to dry out quickly. Moreover, as a material system, the cleft shingles allows a mechanical material performance of the wood and accommodates irregular and non-uniform material elements.

**1** Godal, Jon Bojer. "Nærare Om Spon." In Tekking Og Kleding Med Emne Frå Skog Og Mark - Frå Den Eldre Materialforståinga, 123. Bergen: Fagbokforlaget, 2012.

**2** Ibid., Godal. "Taket.", 95.

Authors translation from Norwegian:
*'det som gjer taket (vass) tett'*

Note:
'Tekking' is a general term for the part which keeps the roof tight, with various materials such as wood shingles, other types of wood pieces ('never', 'bord', 'kvåv') and hewn slate.



[fig.8.2]

[fig.8.3, 8.4]

**3** Vadstrup, Søren. “Information Om Bygningsbevaring: Beklædning Med Træspån.” Kultur Styrelsen, 2012.

**4** Note: Can compensate for the breakage and permeation of water by having thinner shingles which dries faster.

**5** Vadstrup, Søren. “Information Om Bygningsbevaring: Træ Til Husbygning.” Kultur Styrelsen, 2012.

*index card:* ***play***

**6** The notion of *play* is further described in D2, p. 78. Index cards on *‘play’:*

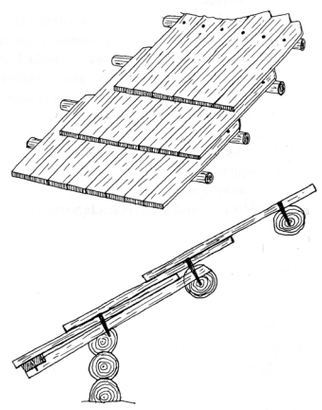
Emmons; Frascari.

[fig.8.5]

The material process of splitting the wood into shingles elements is based on the inner structure of growth rings (spring wood/autumn wood). The wood is split (by hand) following the natural direction of the wood fibres — its *weakest point.* First, the split is determined with an indentation; then, force is applied. The sections are always split into halves to accommodate stress tensions within the wood. [fig.8.2—8.4] By cleaving instead of sawing, fewer of the longitudinal fibres of the wood are disrupted. Thereby the surface has fewer open fibres where water can permeate. The technique could be seen as a reversal of a weak—strong relation: by splitting along the weakest point, the result is a more robust shingle. The splitting takes place radially, which makes the orientation of the growth rings parallel across the shingle, giving the most stable section of the material and limiting potential deformations.[3] The shape and surface topography of the individual shingles elements is determined by the inner material structure. Thus, you are only partially in control of the dimensions. Conversely, saw-cut shingles produced by machines — based upon numerical measurements — give uniformity of the elements and set a lower requirements towards the material (dimensions/ heartwood). However, sawing the wood breaks the fibres and renders the shingle more vulnerable for permeation.[4] The output of the process of cleaving is irregular elements, uneven surfaces and shapes with variations in dimensions of widths, thickness and angles.

The individual shingles are organised in a material system that takes advantage of the irregularity and non-uniformity of the material elements and allows material movement. In the meeting of irregular surfaces and shapes, gaps inevitably emerge; gaps that give space for air circulation and water running off — thus enabling ventilation and drying of the shingles. Furthermore, the shingles are placed with gaps between the individual shingle to enable sideways movement and expansion and contraction of the wood as it cycles between wet and dry. The material deformations are most extensive during the first drying. However, the wood will never find a complete rest.[5] To further accommodate potential mechanical performance and warping, the shingles are loosely fixed

with nails. [fig.8.5] The slightly protruding nails for *play*[6] also become the resting place for the adjacent shingle, keeping them from touching too much and supporting ventilation. The cleft shingles are fastened with one nail, which allows the element to wiggle. The row above secures the overall position. [fig.8.6] Conversely, saw-cut shingles are usually fixed with two nails. With two fixed points, the shingle is more likely to crack when moving.



[fig.8.6]

***MEASURINGS:***
*'Topographical Reliefs'*

The investigations started with the curious aim of getting insights into the material system by delving into the material process. Together with Nikolaj Kirk — a traditional craftsman at *Hjerl Hede Open Air Museum* — an assembly of cleft wood shingles was constructed from a pine wood trunk, composed of eighteen individual shingles in four rows with an overlap of three rows. [fig.8.7—8.9] Thus, the assembly becomes a sample of a roof surface, where the individual shingle is part of a repetitive system. Constructing the element involves material processes (described in the paragraphs above) that centre around cleaving and assembling. Adjustments of the surfaces of the shingles are performed as part of the assembling process, as it is – according to Kirk – *'uncertain what the backside of a shingle should look like until you know what shingle it will be on top of.'*[7] Within this process of making adjustments, there is a delicate balance and negotiation between seeking contact surfaces between the adjacent shingles to find structural stability – and limiting the cutting area to avoid breaking the wood grains and keeping gaps for air venting. The material processes are based upon situational approximation in dialogue with the material instead of predetermined geometrical measurements. Compromises are made through the rule of thumb, considering the particular element in relation to the assembly.

**7** Kirk, Nikolaj. "Conversation during the Process of Construction." Hjerl Hede, October 1, 2020.

[fig.8.7, 8.8]

[fig.8.9]

*index card:* ***precision***

**8** Hughes, Francesca. "Room for Doubt: Instrumentalism, Inference, and Ideology." In The Architecture of Error: Matter, Measure, and the Misadventures of Precision, 83. Cambridge, Massachusetts: The MIT Press, 2014.

**9** Hughes, Francesca. "False Economy: Precision and Error in Architecture (Introduction)." In The Architecture of Error: Matter, Measure, and the Misadventures of Precision, 4–5. Cambridge, Massachusetts: The MIT Press, 2014.

*index card:* ***tolerance***

**10** Index cards on *precision:*

Emmons; Hughes; Shonfield.

**11** The process of 3D scanning and processing the data into a 3D model is performed by Jakob Sieder-Semlitsch, *Technical consultant* at the workshop facilities at Aarhus School of Architecture.

With its irregular and non-uniform material elements, the shingles assembly presents an approach to material systems far from building practice today, preferring regularity, uniformity and predictability.[8] Furthermore, the assembly is a material manifestation of indefinite tacit knowledge and process-based material construction. Thus, it diverges from the normative material and production culture in current architectural building practice, operating with geometrical- and numerically defined drawings/computer models directing material construction. F. Hughes decribes the superlative precision of computer programs calculating and drawing

> 'masonry walls with software designed to cut lenses or map brain tumors.'[9]

The following investigations depart from this apparent clash between the two contrasting material construction approaches. The shingles assembly, considered imprecise by today's regime of precision and tolerance, is submitted into one of the prevalent formats of contemporary building culture – *to see what happens.* Thus, the framework initiates an open exploration from another perspective, strategically chosen. The investigations introduce 3D printing as a way of critically exploring the weak material system and process of the shingles. Thus, the method draws upon an intentional clash, where the weak material system of cleft shingles – originating from approximation and play – is inserted into a geometrical system dependent upon numerical precision and tolerance.[10] In this Demonstration, the Measuring is the *relation between* the shingles assembly and the 3D print.

The shingles assembly is brought into the Cartesian world through 3D scanning, turning the material object into a geometrical condition defined by points. The point cloud is subsequently turned into euclidean geometry of mesh within a 3D model, followed by a material reproduction into a 3D printed object.

***point cloud***

A point cloud is generated through 3D scanning, creating a

digital, geometrical version of the outer surfaces defined by points.[11] Each point position has its set of Cartesian coordinates (X, Y, Z). The 3D scanner is a manual device. It acts similar to a gaze, where the relation of the scanning eye to the object falls within a cone of vision. Light is produced and captured by the scanning device, measuring the distance when impacting on proximate surfaces – a process which is repeated multiple times.[12] The particular process of scanning the shingles element is composed of several steps. First, the outer surface of the element is 3D scanned. To access hidden surfaces between the rows of shingles, the element is disassembled - and each shingle is scanned individually. Then, the element is digitally re-assembled by combining the individual scans. Due to the time-consuming process, the scanning area and further investigations are narrowed down to the two upper rows of the element.

N. Koerner describes how the point cloud as a topological condition disrupts the dominant Euclidean-Cartesian understanding of space. It is a formless condition – with 'no clear interior or exterior, no beginning or end.'[13] According to Koerner, the point cloud exemplifies a meteorological mode:

> '[...] a spatiality of dispersal, a temporality of phasing and materiality of patterned particles.'[14]

Similar to particles of dust settling on surfaces, the scanner measures the material artefact by invisibly covering the outer surfaces with millions of points. Thus, the scanning points share an accumulative character with dust and are form-less – in the sense of not possessing their own form – taking 'on that of its host, the nook in which it sits, the surface on which it is deposited.'[15] Stoppani describes how dust is passive; however, it *activates* the surfaces by coating.[16] Similarly, the scanning points render the surfaces of the shingles assembly transparent and thus activate the surfaces by collapsing inside and outside.

The measuring process of 3D scanning affects the geometrical version of the object. The process of 3D scanning is performed by hand, and each point represents a specific position in a particular moment. Scanning the entire object demands several

**12** Devilat, Bernadette, and Felipe Lanuza. "Drawing (on) the Context: Scanning, Designing, Building." In The Artful Plan: Architectural Drawing Reconfigured, 1st ed., 154. Boston: Birkhäuser, 2020.

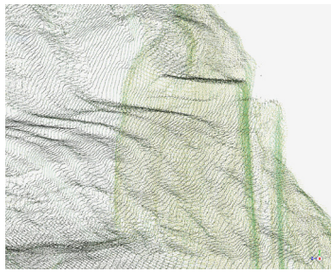
**13** Koerner, Natalie P. "Beyond Millions of Plans. A Geometry of Clouds." In The Artful Plan: Architectural Drawing Reconfigured, 1st ed., 175. Boston: Birkhäuser, 2020.

*index card:* ***particles***

**14** Ibid., 178.

Index card on *particles:*

Calvino.



[fig.8.10]

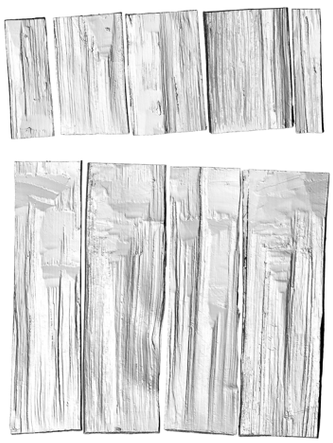
*index card:* ***dust***

**15** Stoppani, Teresa. "Dust Revolutions. Dust, Informe, Architecture (Notes for a Reading of Dust in Bataille)." The Journal of Architecture 12, no. 4 (September 2007): 437.

**16** Ibid.

**17** *Note:*

The point cloud of one shingle is defined by 2,644,587 points - *after reduction.*



[fig.8.11]

**18** Barthes, Roland. “Plastic.” In Mythologies (1957), translated by Annette Lavers, 117–19. London: Vintage Books, 2009.

[fig.8.12]

*index card:* ***processes***

**19** Moravánszky, Ákos. “Paths to Matter.” In Metamorphism: Material Change in Architecture, 56, 2018.

**20** Ibid.

scans – each consisting of an extensive number of points and a particular duration. Thereby, the point cloud is composed of numerous moments (sequences) where a particular moment is, in reality, a stretch of time. Hence, the 3D point cloud turns duration into one singular geometry of points. Despite the accuracy of the scanner device, the manual scanning process inevitably creates varying degrees of point cloud densification. Combining the separate clouds is a heuristic approximation process (wiggling), taking high levels of computing power. Automatic operations within the software subsequently clean the digital file to make it lighter and more manageable, reducing and organising points.[17] In this process the point cloud is made uniform by the homogenisation of the gaps and densities of the points. [fig.8.10] This process of evening the distribution of points involving *medians:* creating average values of a set of data.

***3d printed object***

The point cloud is transferred into a physical material object – via a 3D model – through 3D (powder) printing. Despite the apparent material affinity between the point cloud of particles and 3D powder print, the 3D printer cannot escape the geometric world of surfaces. Thus, in order to print, the point cloud is geometrically processed into a 3D model, turning separate points into a euclidean geometry of surfaces (mesh) – defining definite borders between outside and inside. [fig.8.11] The 3D-printed object acts as a counterpart to the shingles element and is investigated both as a material object (physical properties) and a material process.

3D printed plastic is a favoured material in the production of prototypes, as it provides an inexpensive and fast way of materialising digital shapes. R. Barthes describes plastic as an imitation material belonging ‘to the world of appearances, not to that of actual use.’[18] The neutral colour and appearance of the material gives a defamiliarising effect which brings attention towards the surfaces and topographical conditions. Similarly – in the context of art – Moravánszky describes how minimalist artists made use of industrial materials to create material

objects having a presence 'completely free of references except to itself.'[19] Preferring

> 'industrial surfaces as plywood or concrete rather than materials such as grained wood or veined stone which display growth, deposits, and organic processes.'[20]

Similarly, the white 3D-printed plastic, which feels powdery when touching, gives an uncanny relation and mismatch to the texture and topography. The logical topography of the shingles assembly – resulting from the split force and fibre structure of the wood, and where the inside is readable on the outside – is defamiliarised within the print. Thus, the material arrangement and surfaces read differently when it is disconnected from the logic of the wood. Attention is directed towards the surfaces as a topography which materialises splitting forces. [fig.8.12—8.14]

[fig.8.13]

*index card:* ***process***

Orthogonal, razor-thin lines cut through the white surfaces of the 3D print – interrupting the topography and making arbitrary cuts within the material arrangement. [fig.8.15] These sharp boundary lines separate individual (3D printed) parts. Although the material condition of powder seems unlimited in extent, the dimensions are restricted by the 3D printer. The orientation and relation between the printed objects in the batch are determined by optimisation relating to the total print volume. As the dimensions of the 3D model exceed the printing volume, it is – digitally – subdivided into eleven individual pieces. The individually 3D printed elements are re-assembled with fitting elements hidden underneath. The relation between the individual parts is defined by numerical precision and a tolerance of 0.1 mm.

From the shingles element and the 3D printed relief, one could draw out two different perspectives on the relation between the material object and the process of materialisation. T. Ingold distinguishes between two kinds of material processes – one that is *generative* of the object, and one being

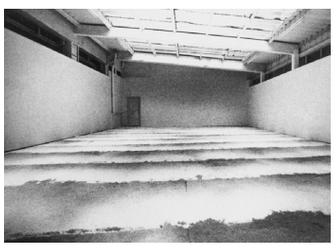
> 'merely *revelatory* of an object that is already present, in an ideal, conceptual or virtual form.'[21]

In the latter case, 'the process disappears or is hidden behind

**21** Ingold, Tim. "On Weaving a Basket." In The Perception of the Environment: Essays on Livelihood, Dwelling and Skill, 346, 2011.

**22** Ibid.

[fig.8.14, 8.15]



[fig.8.16, 8.17]

**23** Video work as digital appendix, described in *Inventory.*



**24** Allen, Stan. "Field Conditions." In Points + Lines: Diagrams and Projects for the City, 1st ed., 92. New York: Princeton Architectural Press, 1999.

*Note:*
Allen's notion of *field conditions* also described in chapter *Researcher's guide (Method)* as a perspective of the overall research method.

**25** Ibid., Allen.

**26** Ibid., Allen.

the product, the finished object.'[22] Similarly, the 3D print physically reproduces a geometry already existing in an ideal, digital version. Unlike the cleft shingles – where the material directs the shape and organisation of elements within the assembly – the material of the 3D print is subordinate to the geometrical scheme of the 3D model. From these perspectives, the investigations seek to establish closer attention to the 3D-printing process and the relationship between material and formal control. The notion of *field conditions* acts as a theoretical apparatus to change the perspective from object to process. Furthermore, the Measurings initiates a dialogue with the artistic work of Barry Le Va – which establishes a framework to unfold the relation between bottom-up phenomena (powder) and an overarching geometrical scheme (digital print file). The video work *Layers of Powder* is an integral part of the Measurings and the subsequent investigations.[23]

***field conditions***

S. Allen describes field conditions as material systems where 'the overall shape and extent are highly fluid and less important than the internal relationships of parts, which determine the behaviour of the field.'[24] Allen uses field conditions to address and engage with dynamic behaviour and complex relations in architecture and urbanism. Field conditions subvert the relationships between figure and ground – object and process. According to Allen, field conditions shift the attention from 'traditional top-down forms of control and investigate a more fluid bottom-up approach.'[25] Allen describes field conditions as

> '[...] bottom-up phenomena, defined not by overarching geometrical schemas but by intricate local connections.'[26]

Allen discusses the powder-based works of B. Le Va as an example of art which moves in the direction of field conditions — redefining sculpture from object to field. From the mid-sixties, the artist — and partly trained architect — Le Va developed powder-diffusion works with materials such as flour, chalk, iron oxide and cement powder.[27] Through floor-based artworks such as *6 Blown Lines (Accumulation Drift)* (1969) and *Extended*

*Vertex Meetings: Blocked; Blown Outward* (1969-71), Le Va dissolved 'the idea of "sculpture" as a delimited entity, an object distinct from the field it occupies.'[28] The work involved pouring linear segments of powder onto the floor, then spreading them into even drifts using an air compressor. [fig.8.16—8.18] A process which was repeated until the entire exhibition space was filled. The compositional principle and material choice of these works are typical for postminimalism, which acted as a counterpoint to the sharply delineated geometry of Minimal sculptures. By working with ephemeral materials such as powder, the artist could not exercise precise formal control over the material. Instead, the work establishes the conditions within which the material is deployed and directs its flows.[29]

Similarly, the 3D printing process is also concerned with material distribution of (polyamide nylon) powder — within an enclosed area bearing spatial resemblance to the exhibition space of Le Va's works. 3D printing is an additive material process where the powder is distributed evenly as horizontal layers of 0.1 mm thickness by a mechanical bar, pushing the material back and forth in a fixed interval. [fig.8.19—8.21] A laser light transfers the printing information from the digital model onto the compressed surface of powder. Extreme temperature fuses the powder particles into solids. A clicking sound and a cross-cutting rift in the surface indicate the lowering of the printing base — followed by the movement of material. The outcome of this repetitive and slow material process is solids emerging from the powdery matrix.

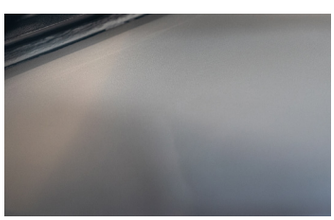
Prior to the material distribution, the 3D model is digitally processed by the 3D printing software and sliced into a series of geometrical section drawings. The sections are made with 0.1 mm distance, corresponding to the thickness of the powder layers. The powder takes on a passive role. It is a material condition made to be homogeneous and with a limited material agency. Thus, the normative printing process is designed to make the powder 'passive' seeking a precise formal control over the material.

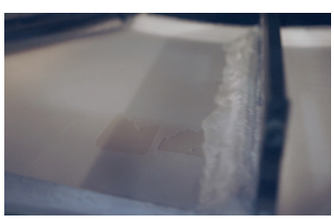
[fig.8.18]

**27** Maizels, Mike. "The Clues and the Aftermath: Barry Le Va and Room 2." In Art Expanded, 1958-1978, edited by Eric Crosby and Liz Glass, Vol. 2. Living Collections Catalogue. Minneapolis: Walker Art Center, 2015.

**28** Ibid., Allen, 128.

**29** Ibid., Allen.





[fig.8.19-8.21]

[fig.8.22, 8.23]

**30** Ibid., Allen.

*index card:* ***dust***

**31** Stoppani, Teresa. "Dust Revolutions. Dust, Informe, Architecture (Notes for a Reading of Dust in Bataille)." The Journal of Architecture 12, no. 4 (September 2007): 437.

[fig.8.24]

***material interruptions***

The artistic work of Le Va demonstrates an approach to material and formal control where conditions were established, allowing the material to flow within. Conversely, the powder within the printer is governed by strict geometrical control. However, 'failed' prints accidentally add another perspective, revealing a crevice in the strict dichotomy of passive material and geometrical control.

During the process of 3D printing, several printing accidents occurred. Usually, this would be regarded as 'failure', implying that the formal intention of the 3D object has not been reached. A common cause of printing accidents is contamination of the homogeneous polyamide (nylon) powder. As unprinted powder from previous sessions is re-used, occasionally, solidified plastic bits appear in the material – disturbing the homogeneity. Material interruptions appear if some of these are located within the printing area. The video work (*Layers of Powder)* captured one of these occurrences. First visible as a ditch, a minor bit attached to the moving arm, scraping the flat uniform surface. [fig.8.22] After some time, the bit falls off, becoming an elevated bump. [fig.8.23] Slowly, the layers of powder deviate from the predefined geometrical sections – disturbing the predetermined. Despite this geometrical disruption, the printing layers continue to build until they reach a tipping point, where the outcome dissolves completely. [fig.8.24] The print accident materialises a friction between the top-down (print file and printer) and the local condition of the material (material impurities). Thus, the local disruption affects the formation of the overall shape, materialising the impossibility of eluding local conditions. The print accident dissolves 'the idea of the print as a delimited material object 'distinct from the field it occupies.'[30] Thus, the 3D printer and material are part of a greater system, impossible to isolate or fully control.

The chamber of the 3D printer represents a space of magnificent control – a regime of material dominance. Inside the chamber, the powder loses its agency and becomes 'dead'. The most vital part happens outside the chamber when the fused powder is removed from the non-fused. Released from its

space, the powder becomes alive again. Like dust, the powder becomes *formless* and active – changing its composition and texture through an exchange of particles with its environment.[31] [fig.8.25–8.27] The impurities disrupting the homogeneous expose the material vitality of the powder.[32] A vitality which makes visible the layered materiality of the print, which otherwise is imperceptible. Similar to the growth rings of wood, it tells the story of the material process and the dominating logic of the 3D printer as horizontal.

[fig.8.25]

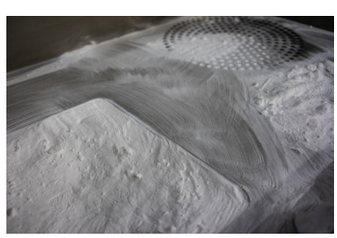
*index card:* ***vitality***

**32** Bennett, Jane. "Preface." In Vibrant Matter: A Political Ecology of Things, viii. Durham: Duke University Press, 2010.

*Note:* Bennett describes *vitality* as the capacity things 'to act as quasi agents or forces with trajectories, propensities, or tendencies of their own.'

***local conditions and (architectural) form***

This Demonstration discusses the relationship between local material conditions and formal control within material systems. Through the 3D print and the artistic work of Le Va, the Demonstration establishes two positions which outline extremes at each end of a spectrum; the material freedom in La Va's work and the 3D printer's supreme geometrical control. In the work of Le Va, there is a spatial extent/framework of control outside the local condition of material processes. In comparison, the 3D printer operates with a strict border towards the outside environment, where the inside is rigorously controlled. These two positions operate as opposites within the Demonstration but are not intended as absolutes. The Demonstration seeks to initiate an architectural discussion within this spectrum – unfolding between the extremes with varying degrees of geometrical control.



[fig.8.26, 8.27]

The weak material process and -system of cleft wood shingles acknowledge the inability to exercise precise formal control over the material. Instead, the control which is dismissed is operative within the material system. Local material conditions of growth rings direct the shapes and surfaces (form) of material elements, and local connections of gaps and touching surfaces direct the overall organisation of material elements. Hence, the material system of cleft shingles embeds a relational perspective of form, which corresponds to Allen's field conditions:

> 'Form matters, but not so much the form of things as the forms *between* things.'[33]

*index card:* ***form***

**33** Allen, Stan. "From Object to Field: Field Conditions in Architecture and Urbanism." In Space Reader: Heterogeneous Space in Architecture, 120. AD Reader. Chichester, U.K: Wiley, 2009.

**34** Hays, K. Michael. “Introduction.” In Points + Lines: Diagrams and Projects for the City, 1st ed., 3. New York: Princeton Architectural Press, 1999.

[fig.8.28]

**35** Ibid., Bennett, “Neither Vitalism nor Mechanism.” 80–81.

**36** Ibid., Allen, 119.

**37** Ibid., Hays.

In the material system of cleft shingles, the form between the shingles is non-material gaps, which have equal importance within the system as the material elements – leaving space for material movements and flows. [fig.8.28] As a material system, the cleft shingles comprise a combination of local conditions developed tactically within an overall geometrical scheme. Thus, the material is allowed to move/has freedom on a local level while simultaneously being subject to an overall system. Hence, the clefts shingles operate in a dialectical relation between local conditions and a meta-level organisational schema rather than numerical control.

Where Allen’s notion of field conditions is focused around the relationship between form and spatial conditions related to use and activity (function),[34] this Demonstration suggests a relevance in expanding the notion into a minor scale of spatial conditions and material activity (vitality). Thus, the material system of cleft shingles can be understood as a field condition that can engage with complex relations and dynamic behaviour of an unstable, vibrant material. Furthermore, the wood shingles are part of a greater environmental system of forces – connecting to what Bennett describes as ‘the pulsing, conative dimension’ of (material) agency – and how such a pulse is ‘engaged in a system of pulses.’[35] Correspondingly, the Demonstration seeks to move from architectural objects – distinct from the field it occupies – to relations between materials and parts, and thus – in Allen’s words – ‘moving from the design of discrete artefacts to a choreography of multitudinous relations.’[36]

K. Hays describes how form – within the framework of field conditions – is reconceptualised

> ‘as a condition conducive to certain outcomes, certain possibilities of activity and habitation. Form is an instigator of performances and responses, a frame that suggests rather than fixes [...].’[37]

Within an architectural framework, a dialogue between control and material flow furthermore points towards a discussion of scale and relations. It is not merely about the relationship

between a delimited controlled field towards an exterior. Instead, it should be perceived as embedded/immersed systems with interrelated degrees of control – similar to the shingle-covered surface, which is part of an overall geometrically defined building structure.

In this Demonstration, the 3D print becomes an analogy to current building practice. Although we have precise tools, the 3D print shows the absurdity of regularizing our heterogeneous world through numerical tolerance and control. Thus, the Demonstration questions if numerical and geometrical control has received a too dominant role within the architectural discourse.

## *Discussions across the Demonstrations*

## *Discussions across the Demonstrations*

The Demonstrations derive from an open, explorative approach driven by strategically chosen perspectives. The outcome of this research provides a set of insights of a weak and process-oriented material approach, supplemented by insights and discussions of formless material dimensions. From the specific insights, overall architectural and theoretical perspectives are drawn, pointing towards emerging openings and future research terrains.

Weakness and formless are terms and concepts which elude precise definitions and generalisation. Correspondingly, the findings deriving from the investigations are not conclusive or finite answers for how to approach architecture. The research points towards specific potentials or characteristics of a weak material approach, which unfolds within a scope between formal appearance and inherent material behaviour. With these insights and perspectives, the research seeks to challenge and supplement prevailing architectural material practices. Hence, the research should be understood as a contribution which complements other approaches. The research initially started with questioning and culminates with the formulation of more precise and qualified questions.

From the perspective of particular material phenomena, the investigations have generated insights discussed as general principles or propositions within the specific Demonstration. This chapter discusses the three Demonstrations across the specific findings and insights, detecting overlaps and differences. Although each Demonstration has its distinct logic and specific findings, they all investigate from a material dynamic and relational point of view – creating a shift of attention from material to process, solid to void, or object to field. Thus, the research establishes a framework of material system of forces and processes, which composes complex and multifaceted architectural material perspectives. The different focuses of the three Demonstrations (D1, D2, D3) initiate and

direct various discussions centred around temporal, spatial and contextual material dimensions.

***weakness and material relations***

The research establishes a framework for investigating material relations as part of a greater (environmental) system of forces and processes. The investigations depart from particular material phenomena and oscillate between scales (material zoom-ins, larger scale perspectives), between various degrees of material instabilities, and the visible and the intangible as integral parts of the system. A weak material approach considers how the particular works within the overall system. It involves that some parts of the material system are less rigid, resistant or dominant to contribute to the overall material system – the totality. Thus, even the minor and minuscule, the hidden or material conditions for the time to come – are part of the system.

[fig.9.1, 9.2]

The set-up of the Measurings establishes material relations – constructed – yet, already in existence. In D1, framing a material – in D2, interfering with a material object; [fig.9.1] and in D3, constructing material artefacts. The material is situated as part of an overall system within a dynamic environment of materials and forces, where the set-up intentionally seeks to create frictions, clashes, and interruptions – *activating* the material and producing effects. [fig.9.2] Thus, the Measurings utilises the instability of the material to make it perform. Air activates the lime water, producing crystallisation of exposed surfaces. The endoscope kicks up the dust within the gap. Hands separate (and mix up) the powder and the solid. The investigations are not objective or neutral but are positioned encounters which reflect the messy and complex environment. Complexities unfold within the local through the Measurings – as 'a poesis snapping into place.'[1] What Stewart describes as a poesis in ethnography can be translated to DeLanda's notion of emergent properties of materials – material effects which emerge in the particular meeting between materials and forces.[2] Furthermore, Stewart articulates the active role of the researcher and the non-calculable dimensions of this poesis,

**1** Stewart, Kathleen. "Weak Theory in an Unfinished World." Journal of Folklore Research 45, no. 1 (2008): 81.

**2** De Landa, Manuel. "Realism and Materialism." In The Rise of Realism, by Manuel De Landa and Graham Harman, 11. Cambridge, UK: Polity, 2017.

which underlines how this research approach shares similarities with ethnography as much as natural science.

Although considering significant parts of the system, getting a complete overview or total control is impossible. Thus, material investigations within the research take on another role than natural science (technical/calculable). Even though technology has invented comprehensive computer models for increasing prediction, the MOSE project in Venice exemplifies the impossibility of total prediction and control within material systems. Despite simulations reproducing environmental conditions such as wind, weather and tides, the flooding gates have met considerable challenges within the dynamic, unstable environment. Mechanisms of the gates have been obstructed by sediments and eroded from mould – and the other way around, have harmed the environment of the lagoon.[3] This research instead aims to raise awareness of significant parts within the complex system, which can be used to initiate a direction for changes.

**3** Rosenthal, Elisabeth. "Venice Turns to Future to Rescue Its Past." New York Times, February 22, 2005.

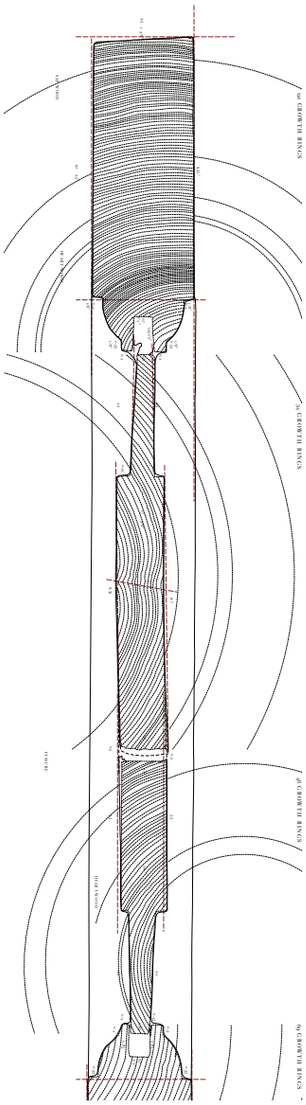
The research connects formless dimensions of materials to degrees of instability and organisation,[4] involves dynamic material behaviour and change of material conditions, and consequently, unstable geometrical dimensions. The reading of formless as a verb emphasises what the materials do (performance). This approach corresponds to a new materialist perspective which goes beyond materials as categories (fixed identity) and involves a process-oriented comprehension of materials.[5] The broad approach to material sources for the research reflects a new materialist approach, where everything is considered to have a material side/materiality. Thus, although the materials within the Perspectives – such as felt, fat, cardboard, lead, and flour – are far from conventional building materials, these artistic examples also speak of the particular role of materials within an overall system which engages with performative, experiential effects and formal appearances.

*index card:* ***formless***

**4** Harman, Graham. "Realism and Materialism." In The Rise of Realism, by Manuel De Landa and Graham Harman, 22. Cambridge, UK: Polity, 2017.

**5** Sundahl, Stine. "Materialer Som Energi – Materialeadfærdens Territorium." In Materialeadfærd, 61–62. Copenhagen: Royal Danish Academy, 2019.

The following paragraphs unfold insights into the role of formless material dimensions within a weak material approach and how the formal and the formless operate as integral parts of



[fig.9.3]

the system.

***relations of material instabilities***

The research investigates how different degrees of material instabilities are put into a performative relation within material systems. Thus, degenerative material processes are integrated into an overall choreography of the material system. In D1, the emergent properties of lime, in the relation to forces of moisture, are utilised within the overall system. The lime coat layer takes a sacrificial role in the material relation to bricks. The performance of the lime parge coat layer – capillary effect – emerges from the inherent material structure (of grains) and the organisation of the material (order of layers, from coarser to finer).

Similarly, in D3, sacrifice and degeneration are integral parts of the material choreography and system of shingles. Like the lime parge coat in D1, the roof shingles act as a sacrificial surface, protecting the roof structure beneath. Furthermore, the material process of oxidation of the nails – which fixes the individual shingles in a material arrangement – is incorporated into the material system. Instead of using nails of stainless steel, the fact that rusted nails have a reduced resistance is utilised. As rusted nails have a similar lifespan as wood shingles, replacement of shingles becomes easier with degenerated nails.[6] Thus, similar to the sacrificial lime layer, maintenance becomes part of the overall choreography of material relations.

Also, in D2, the material system of the traditional panel door organises its parts by differentiation of material instability, utilising the inner material structure of grains to limit and direct dimensional changes. The frame – designed to be the most stable within the system – comprises wood sections of straight grain (longitudinal direction of grains), as the wood has greater strength and less shrinkage in the grain direction. The panels are made of cross-grain sections of wood (sidetræ).[7] As part of the investigations of D2, the sectioning of the panel doors was also investigated as a material system through geometrical, sectional drawings – as a way of understanding the material

**6** Kirk, Nikolaj. “Conversation during the Process of Construction.” Hjerl Hede, October 1, 2020.

**7** Thaulow, E. “Samling Af Dele Af Træ.” In Træ Og Træets Bearbejdning; Forelæsninger, 188–94. København: Jul. Gjellerups Forlag, 1912.

logic of the system. The organisation of the parts in relation to grains and counter tensions is visible in these drawings (appendix).[8] [fig.9.3] Thus, the material system is organised to negotiate the movement of the different parts.

Some of the geometrical and numerical deviations within the drawings are traces of material performance of the life cycle of the doors. But also, the numerical imprecision tells the story of the construction of the door as a material process taking place before tools and technology could perform – and were dependent upon – measurements of extreme numerical precision. One of the panels within the drawings has reached its limit of performance, as it is split (possibly because the thick layers of paint have restricted its movement). However, similar to the parge coat, the material system of the panel door – which originates from a material resource perspective – can be taken apart, and parts can be replaced. Thus, the temporal relation between degrees of material instabilities within a material system gives a tactical dimension.[9] It gives a scope which makes it possible to intervene. These insights draw attention to the quality of a porous and composite material set-up (form), where material elements can be added, removed or replaced.

***relations of local conditions and geometrical control***

In various ways, the three Demonstrations operate within a spectrum between overarching (formal) control and local (material) conditions.

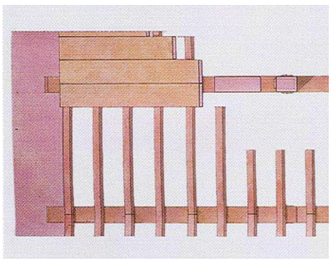
D3 unfolds relations between local material conditions and overall formal control from a material system point of view. The shingles embed a considerable degree of material freedom on a local level, where the organisation of in-between gaps becomes a way to bring it back under another degree of control. Thus, the overall field of shingles is controlled at several local points (nails). [fig.9.4] The precise locations of the nail are not prescriptive but depend on the individual shingles. The shingles exemplify a dimension of scale and irregularity. Although the geometry of the individual shingle changes – and as a consequence, the gaps between as well – the geometrical

**8** *Note:*
The sectional digital drawings were developed through a process of scanning the cutting surface of the door sections (on a photo scanner, modified by the author). The various scans were combined and digitally re-traced as lines. The drawings are included as a separate appendix to the dissertation, in full-size.

**9** Allen, Stan. “Field Conditions.” In Points + Lines: Diagrams and Projects for the City, 1st ed., 92. New York: Princeton Architectural Press, 1999.

[fig.9.4]

**10** Piana, Mario. “Materiali, tecniche, sistemi costruttivi dell’architettura lagunare; problemi di conservazione e di nuova utilizzazione (Italian translation).” In La Imagen de Venecia en la cultura de la restauración arquitectónica, 153–80. Edición al cuidado de Javier Gallego Roca. Universidad de Granada, 2003.



[fig.9.5]

**11** *Note:*
The used reggetta is from Punta della Dogana, obtained during a visit in 2018 from the restorer Adriano Cincotto. It originates from the end of the 17th century.

The unused reggetta is obtained from Chief Engineer Davide Beltrame at St. Marks Cathedral. The photographs of the material details are from a roof visit to the Cathedral with Beltrame in 2019.

[fig.9.6, 9.7]

relations of the field appear retained. Thus, zooming out, the field of shingles as a greater area appears more regular than the irregular individual element.

Similarly, in D2, the formal appearance of the door is controlled at specific points (gaps). Thus, movement of the panel is enabled without the overall geometry of the door being disturbed. Correspondingly – on another scale (of building and the city) – in Venice, hidden gaps between building parts allow movement, as between the floor structure beams and the (non-bearing) facades. [fig.9.5] It is visible on the facades how the material system of the traditional Venetian buildings operates in a vertical direction, where misalignments (settlements) of 20-30 cm between the different walls are typical in the city.[10]

These two Demonstrations make visible ways of allowing material instability or irregularity as the control acts on another level. Although the material moves, the material system is, to a certain degree keeping the overall geometrical relations. This weak approach to material systems becomes a way of inducing elasticity of the form and provides a way of achieving another kind of geometrical control/direction, not dependent upon fixed numerical dimensions.

A particular material detail found in Venice called reggetta gives another perspective on the relation between local conditions within an overall material system. The regetta is made of annealed copper and is part of the roof cladding construction on buildings such as *Punta della Dogana* [fig.9.6] and *St. Marks Cathedral.*[11] [fig.9.8] The reggetta fixes the lead cladding to the wood structure underneath through the act of folding – thus, avoiding piercing through the lead surface. However, more importantly, the positioning of the element embeds freedom in relation to the local material conditions of the wood (underneath) and the lead surface. Instead of a geometrical predetermined dimensioned angle bracket, the process of folding is performed on-site – finding the most optimal location. [fig.9.7] Thus, the exact location is negotiated on-site.

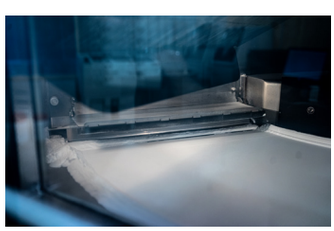
***relations of materials and borders***

In different ways, the Demonstrations engage with material relations and borders. Together, these various insights give perspectives on the role of the formless as a liminal condition, subverting the need for definite and fixed (geometrical) boundaries.

[fig.9.8]

In D2, the liminal condition of the gap inside the panel door is exposed – a dynamic spatial condition, negotiating between the material behaviour of the wood and the formal appearance of the outside surface. The investigations expose a porous border between the outside environment and the inside of the gap. Due to the changing dimensional conditions of the gaps, these could be described as geometrically unstable. Although the gaps derive from a specific measure (Danish 'tomme') at the time of construction, neither the gap itself nor the overall material system depends on maintaining fixed numerical dimensions.

In D3, the 3D printer exposes an inside-outside relation. However, in this case, there is a strict division between the inside and the outside environment. [fig.9.9] The printing powder is under a strict regime of geometrically controlled material process inside the chamber. Outside, the two conditions of loose powder and solid print become mixed through interaction with the outside environment (such as hands excavating, dust and particles in air and surfaces). Brought inside the chamber for reuse, material impurities of the powder become critical. Thus, the Demonstration materialises the challenges with isolated environments, as the particular is always part of a greater system/environment. The formless material dimensions – deviating from the structured and organised material logic of the powder – make visible the vulnerability of rigid borders and a binary relation of either success or failure.



[fig.9.9]

Similar insights can be drawn from D1, where borders and liminality can be discussed by comparing the (sacrificial) parge coat layer and the contemporary equivalent of a vapour barrier. These two examples reveal different ways of approaching borders. Contemporary vapour barriers work horizontally as

a resistant material layer – either through the insertion of an acid-resistant stainless steel plate (in older buildings)[8] [fig.9.10] – or in building construction, such as a polyethylene sheet. The vapour barrier works as a separation *line,* restricting the movement of rising groundwater through a strictly defined physical demarcation. Thus, the vapour barrier reveals a similar binary relation as the 3D printer in D3. Water is to be kept underneath this strict border. Either it succeeds or – if a minor fracture in the border appears – water enters through, and it fails. Conversely, the layer of the parge coat operates as a border between the bricks of the foundation and soil moisture in a different way. The lime acts as a liminal condition between bricks and moisture. Thus, the layer works as an active *field,* directing the ground moist upwards and outwards. [fig.9.11]

The formless dimensions of the gap (D2) and the lime layer (D1) expand the border situation into an active, performative condition and dissolve the need for fixed borders. In continuation of this discussion, these insights are further elaborated within a contemporary architectural perspective of component-based construction methods. K. Shonfield describes the component-based construction method as a 'harsh or rigorous form of construction [which] cannot vary to allow the presence of other components.'[12] Within material systems, something needs to give in – and Shonfield points out that the more distinct and unadaptable the individual elements are, the more the need is for tolerance.

With today's industrialised production technology, construction processes previously solved on the construction site are often resolved in advance in software based on predetermined geometrical measurements. In this perspective, formless materials – not dependent upon numerical fixed dimensions – have potential. The research has encountered structurally (and geometrically) unstable materials in liquid, gooey and porous conditions. Similar to the gap or the lime parge coat, these material conditions possess a degree of (geometrical) incompleteness, allowing them to be applied or squeezed in. Similarly, another malleable material condition, such as oakum ('værk') – traditionally used as a material stuffed in-between gaps of building parts for sealing off from wind and weather

**8** https://cortexfugtspærre.dk/wp-content/uploads/2021/02/Cortex-Brochure-fugtspaerring-final.pdf

[fig.9.10, 9.11]

*index card:* ***tolerance***

**12** Shonfield, Katherine. "Why Does Your Flat Leak?" In Walls Have Feelings: Architecture, Film, and the City, 40–42. London ; New York: Routledge, 2000.

**13** Bak-Andersen, Søren. "Værk." In Gammel viden til nye bygninger: Traditionelle byggematerialer og håndværksteknik i nutidigt byggeri, 143. København: KADK, 2020.

– allows the 'work' of different material elements.[13] Thus, the research identifies a potential of the formless in architectural construction, which goes beyond a structural role – as material or spatial conditions that operate in-between other more strict geometrically, numerically defined components. Furthermore, the research points towards a possible tactical dimension of formless materials within the transition from drawing to construction.

These in-between formless conditions – as part of an overall weak material, relational approach – connect to the traditional concept of *play.* As described in D2, play is an indefinite condition that gives a scope – or elbow room, as Emmons describes it – an active condition made available. The parts are not entirely fixed to totality, whereas the Cartesian concept of tolerance seems to embody an idea of (control of) totality. Frascari describes how play presents particular solutions while tolerance establishes conventions and general solutions.[14] The two concepts possess two different approaches to dealing with formal control and material uncertainties. As Shonfield points out, 'if you build in a tolerance in building construction, you are acknowledging that edges may not always be in the exact place where lines have officially been drawn.'[15] Thus, tolerance operates as a precaution, exposing a formal ideal that the material most likely will fail to achieve. While material relations with play accept approximation and accommodate material deviations.[16]

[fig.9.12]

*index card:* ***play***

**14** Frascari, Marco. "Tolerance or Play: Conventional Criticism or Critical Conventionalism in Light of the Italian Retreat from the Modern Movement." Midgård Journal of Architectural Theory and Criticism 1, no. 1 (1987): 7–10.

**15** Ibid., Shonfield.

**16** Emmons, Paul. "Play of Scale." In Drawing Imagining Building: Embodiment in Architectural Design Practices, 196. New York: Routledge, 2019.

***weakening the architectural image***

The following paragraphs reflect upon the research subject of weakness and the use of artistic practices.

The formless dimensions the research explores connect to Bachelard's description of materials as *pasty*.[17] Bachelard describes how the world is typically imagined as geometric, deriving from a contemplation of solids. However, matter is very porous – which is made visible, depending upon how close you look, how long you wait. [fig.9.13] Correspondingly, in the Measurings, the camera establishes an attentive gaze for observation. Particularly, photographic investigations are crucial in capturing close-up views of material moments.

[fig.9.13]

Within an architectural theoretical discourse, 'architecture's image' typifies a notion of architecture as a static ideal. As unfolded in D2, Stoppani describes the (material) gap between architecture's image and its physical realisation – a distance between the idea and construction/inhabitation.[18] Thus, the image is regarded as a powerful, 'strong' format. Within the research subject of weakness, the format of the photograph as image-based investigations could seem contradictory. However, as described below, the investigations perform similarly to what Pallasmaa describes as a 'weakening' of the architectural image',[19] and initiate multifaceted reflections upon the relation between *weak–strong*.

*index card:* ***weakness***

At the time of the invention of the camera – throughout Europe in the twenties and thirties – camera-seeing received a special status. With this, human eyesight became regarded as 'weak'.[20] (simply, defective, impotent). Krauss describes how the camera was 'regarded as an extraordinary extension of normal vision',[21] which gave the possibility to see the world with different eyes. Similarly, the Measurings utilises the technical capacities of the camera, which enables capturing information which otherwise would go unnoticed. Through the photographic work, the Measurings heighten the reality and give presence to what is usually not visible in architectural representations. Thus, the research set-up draws upon a contrast between what is usually regarded as a 'strong' format (photography as a static,

**17** Bachelard, Gaston. "Les Intuitions Atomistiques. (Essai de Classification)." Paris: Boivin et Cie., Éditeurs, 1933.

**18** Stoppani, Teresa. "Dust Revolutions. Dust, Informe, Architecture (Notes for a Reading of Dust in Bataille)." The Journal of Architecture 12, no. 4 (September 2007): 439.

**19** Pallasmaa, Juhani. "Hapticity and Time - Notes on Fragile Architecture." The Architectural Review 207, no. 1239 (2000): 78–84.

**20** Krauss, Rosalind E. "Photographic Conditions of Surrealism." In The Originality of the Avant-Garde and Other Modernist Myths, 12. print., 116. Cambridge, Mass.: The MIT Press, 1985.

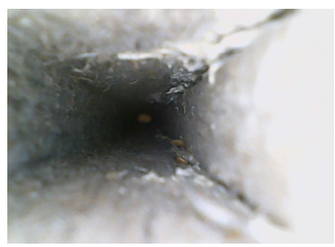
**21** Ibid.

fixed medium, architecture's image) and the actual material appearance in the photos of a disorderly material world. The photographs of Hammersøi's white doors in their present material state (D2) reveal that they are not merely white. Zooming in on the surfaces, all kinds of nuances are revealed; cracks, fine tension lines, brush strokes, and densification of paint. [fig.9.14] Or within the door gap of a traditional panel door – a material condition far from any formal ideal is revealed. [fig.9.15]

[fig.9.14]

These insights could be discussed in relation to Pallasmaa's 'architecture of weak structure and image', which present a perspective and opposition to – what he coins – 'a 'strong' singular image and consistent articulation of form.'[22] The investigations make use of a 'strong' medium, but the motifs/ material objects of the images shed light on the material disruptions, irruptions and deviations – thus, weakening the 'architectural image.' The cracks and fine lines on Hammersøi's doors, the putty and paint within, the steam on the lens, the lumps in the printing powder, and the thin crust that breaks are all part of overall material systems, possessing different degrees of porosities and permanence – comprising particular moments within the life cycle of materials.

**22** Ibid., Pallasmaa.



[fig.9.15]

The research suggests an architectural practice of multiple images – including possible future material moments. Like J. Soane depicting his buildings as ruins, these images would involve envisaging architectural scenarios that acknowledge material changes as part of the design. These multiple images connect to Vattimo's intention of 'weak thought' as introducing multiple perspectives and several points of view, thus, disturbing the architectural image as one ideal state.

***formless and the euclidean-cartesian world***

Unlike artists – who usually work directly with their materials – architects work with materials through descriptions, specifications and visualisations. M. McVicar describes the complex task of precise communication in architectural construction, translating architectural intentions into a neutral and quantifiable language.[23] Through a construction process, the representations obtain a physical presence. From the perspective of architectural practice, it is relevant to have a closer look at the formats of architectural working practices and draw attention towards the position of the formless material dimensions within the Euclidean-Cartesian world.

Sundahl describes how the *digital matter* – central in the architectural working process of developing spaces and shapes – is resistless and abstract. It is assigned physical properties as surfaces and textures, which can be rendered into digital images. Thus, Sundahl points out how form (geometries, shape) and material are freely and resistlessly related in the digital working process.[24] At the time of actualisation, the reality of the digital matter is imposed on the physical materials. However, the tools used in architectural practice do not consider that materials are porous. Thus, this research points out the discrepancy between the porous material world and the prevalent Euclidean-Cartesian understanding of space – where the digital realm mirrors the geometric contemplation of the world as solids which Bachelard describes.[25]

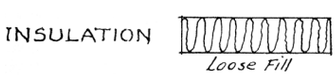
In architectural CAD drawings, formless, non-rigid insulation materials/batt are represented with rigid symbols as an undulating line (lemniscatic line). [fig.9.16] According to the 1932 first edition of *Architectural Graphic Standards,* it should be drawn freehand 'to create irregular, varying undulations.'[26] Material surfaces are categorised by technical drafting symbols of standardised texture lines. According to Emmons, 'modern material symbols are considered arbitrary conventions with no particular significance other than distinguishing one from the other.'[27] Correspondingly, the 3D computer model relies upon definite, enclosed solids. More advanced software for detailed architectural design as Revit similarly defines materials as

**23** McVicar, Mhairi. "Defining Precision and Ambiguity." In Precision in Architecture: Certainty, Ambiguity and Deviation, 46. Abingdon,Oxon New York, NY: Routledge, 2019.

**24** Sundahl, Stine. "Materialer Som Energi – Materialeadfærdens Territorium." In Materialeadfærd, 80–82. Copenhagen: Royal Danish Academy, 2019.

Translations from Danish: *'det digitale stof'*

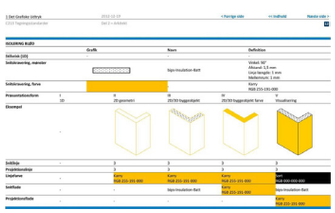
**25** Bachelard, Gaston. "Les Intuitions Atomistiques. (Essai de Classification)." Paris: Boivin et Cie., Éditeurs, 1933.




[fig. 9.16]

**26** Emmons, Paul. "Synesthetic Material Symbols." In Drawing Imagining Building: Embodiment in Architectural Design Practices, 149–50. New York: Routledge,

**27** Ibid., 144-45

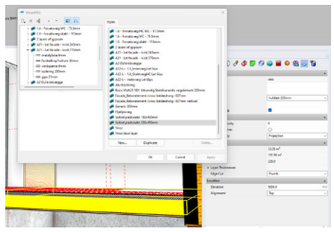


[fig.9.17]

solid objects by numerical measurements and geometrical dimensions. BIM software (Building Information Modelling) similarly works with materials as building components, categories and numerical values. [fig.9.17, 9.18] Soft, formless materials, such as isolation, are depicted as solids. Cavities within the wall structure are present within the model as numerical values. Looking closer into how the software works with the relations between these material components, joints frequently cause challenges and need more detailing in separate 2D drawings. [fig.9.18] Similarly, in-between materials – such as window joints – are drawn within the software as a direct meeting between wall opening and window frame, and specifications instruct the manufacturer of the specific measure which should be extracted for the joint.

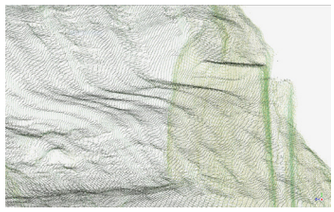
These software programs have in common the need for definite borders between inside and outside. Thus, the formless material dimensions are absent within the digital realm. In this respect, the point cloud – as a formless, topological condition – is a digital representation which positions closer to the porous world of atoms which Bachelard describes. [fig.9.20] However, as described in D3, it is – at the current moment – challenging to move from the point cloud towards materialisation.

The research draws attention towards the lack of presence of formless material dimensions within the Euclidean-Cartesian world and the marginal role of these dimensions within contemporary building practice. Furthermore, the research notices that the definition of precision references 'abstraction, separation, cutting off: precision gained by losing, editing, simplifying.'[28] Like Bataille's use of formless as an operative term in his critique of the static format of the dictionary and fixed definitions of words,[29] the research critiques how the diverse, dynamic and unpredictable dimensions of materials are reduced to static categories within the formats of architectural working practices. Thus, the research points out the need to incorporate a more nuanced and expanded understanding of material precision within architectural working practices.



[fig.9.18, 9.19]

**28** Ibid., McVicar.



[fig.9.20]

**29** Noys, Benjamin. "The Subversive Image." In Georges Bataille: A Critical Introduction, 18–19. Modern European Thinkers. London ; Sterling, Va: Pluto Press, 2000.

*index card:* ***control***

***experiential dimensions of unpredictability***

The increasing aim for predictability and control in contemporary building practice reflects a general societal tendency, and inscribes into a broader social and philosophical discussion.

The sociologist H. Rosa describes the modern desire to make the world controllable, 'rendering it visible, reachable, manageable, useful.'[30] However, Rosa points out that it is in encountering the uncontrollable that we really experience the world. Rosa uses the term *resonance* to describe a mode of relation where you at once are moved by the world, and are moving the world.[31] Rosa argues that a world that is fully known – where everything has been measured, planned and mastered – would be a dead world:

> 'Where "everything is under control," the world no longer has anything to say to us […].'[32]

Similarly, in his critique of an architecture of a strong image, Pallasmaa points towards how the tendency of technological culture 'to standardize environmental conditions and make the environment entirely predictable,'[33] has caused a sensory impoverishment. Pallasmaa – paraphrasing M. Merleau-Ponty – states that

> '[t]he task of architecture is to make visible 'how the world touches us' [...].'[34]

These philosophical perspectives shed light on the experiential dimensions of unpredictability. Similarly, a weak material, relational approach that works with the forces leave scope for resonance. Thus, the research points towards the experiential qualities of architecture which are given time to settle, and revealing material changes, which nurture speculations and trigger the imagination.

**30** Rosa, Hartmut. "Four Dimensions of Controllability." In The Uncontrollability of the World, 17. Cambridge, UK ; Medford, MA: Polity Press, 2020.

**31** Ibid., 116.

**32** Ibid., 31.

**33** Ibid., Pallasmaa.

**34** Ibid.

# *Research trajectories*

## *Research trajectories*

Using weakness as a critical research framework has led to a research project with a composite character of numerous material perspectives, where the research takes place within the relations between them. The research has been driven by a persistent attentiveness to materials – through direct engagement of hands-on investigations, from various positions of theory, history and art and through encounters with people in particular places. Thus, the research develops within a field of coincidences and discoveries and strategically chosen theories or perspectives.

The outcome is a research project with openings and latent potentials; of index cards not yet activated or made – or material investigations and artistic perspectives not yet forming a Demonstration. Thus, the research is still considered active and porous, and the format of this written dissertation constitutes this particular moment within a process.

***future research terrains***

The research has an emerging relevance within a contemporary architectural material practice, within the emerging sustainable discourses. After years of dominance by industrialised – and often inorganic – materials, building practice has gained a renewed interest in biogenic materials in an (ongoing) sustainable transition from conventional building practice to reduce carbon emissions.[1] Thus, unstable materials – materials which can breathe, decompose and be active parts within a greater environment – are vital in a future architectural practice perspective. Some of the materials that have gained a renewed interest in practice are clay- or lime plaster, or recently developed material technology, such as hempcrete (hemp, lime, water). [fig.9.20] The material is diffusionopen, comes in various material conditions as fluent/pasty (casting), solid (geometrical blocks) – and can be disintegrated for reuse. However, the research is open to the material possibilities that may open and

**1** Projects such as the *Reduction Roadmap,* working with industry-specific reduction targets for new Danish housing projects. https://reductionroadmap.dk

[fig.9.21]

seek to continue exploring the gap between formal appearance and material performance.

The research identifies a future research terrain within a sustainable material perspective where working with the unstable material, forces and processes becomes vital. With the basis of the framework, vocabulary and insights established within this PhD project, the research can contribute with particular attention towards performative and experiential dimensions of materials and relations – based on a weak and formless architectural (theoretical) perspective. The research will continue to build upon the *Operative Dictionary*.

This research project lays the foundation for future research, with material investigations which take place closer to architectural practice, generating and exploring through proposals on a material, local level.

## *Epilogue*

During this research, I have been considering how the material surroundings in my childhood have affected my curiosity and approach to the research subject. I grew up in a gap between traditional and industrial material approaches.

My family's house was a typical standard house of wood from the 70s – similar to all the other houses in the neighbourhood. The outside facade facing the street had shutters outside the windows. However, I never questioned that the shutter panels were purely for decorative purposes and were fastened with screws to the wall. The windows had attached a grid of wood laths on top of the glass surface to appear sub-divided. The wood facades were protected with coats of an impervious shield of nylon-based paint, which kept the water out (but also retained it within, if permeating through a rift in the coated layer). Inside the house, the floor was covered with vinyl with wood structure print. The doors were 70s hollow core doors with veneer – which, during a redecoration – were painted and attached wood mouldings. At the beginning of the 90s, I remember – for a short period – we had plastic flowers that could not perish (but collect dust).

The house was located in a mountain village in Norway, in Hallingdal. There is a long craft tradition within the area, such as log construction ('lafting'), and numerous examples of these building dating from the late 1600s and up to the early 1800s were located nearby. As an inhabitant, these surroundings were merely something with decorative and historical value. It was not until the end of my architectural studies in Denmark, returning to visits, it caught my attention. These surroundings were, in a way, defamiliarised to me and thus heightened my awareness and triggered imaginary dimensions of a material world in constant change.

[fig.10.1]

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Historic photograph from Venice.
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[fig.2.2]
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