

The Louhisaari pursuit

Revitalising small scale lime burning tradition in Finland

NORDISK KALKFORUM 2024 Martti Peuransalo Livady Arkitekter



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Forgotten skills and revitalising

Louhisaari pursuit



Personal introduction

Martti Peuransalo

Architect, M.Sc.Tech (industrial management)

Livady Architects, Finland





Louhisaari Mörka

400 years old

Dark and hard mortar



Pursuit of forgotten skills

History of centuries...millennia

Some recent attempts: successes and failures





Louhisaari pursuit

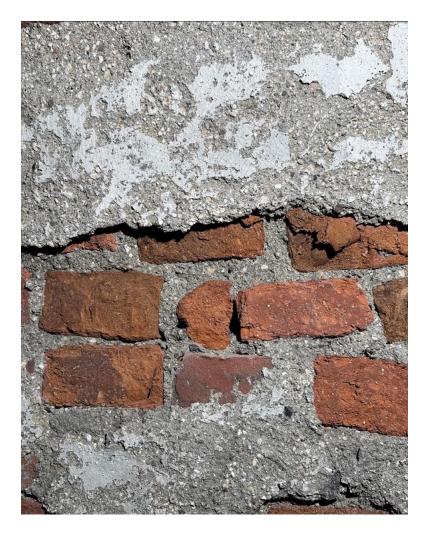
Revitalising small scale lime burning tradition in Finland

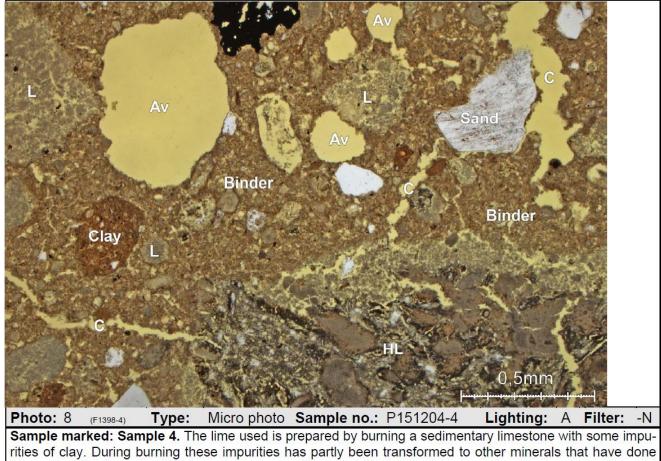






Louhisaari Mörka — Seir Analyses





the mortar slightly hydraulic. The aggregate used has contained some lumps of clay. Lumps of pure lime (L) and impure lime (HF). Air-voids = AV. Shrinkage cracks = C

selr-materialeanalyse A/S. 2016. File: 151204, Report: R151204

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Louhisaari Mörka — Seir Analyses, 2016

Source:

SEIR-materialeanalyse A/S

File: 151204

Date: March 30th, 2016 Report no.: R151204

Sample 1: brick laying mortar

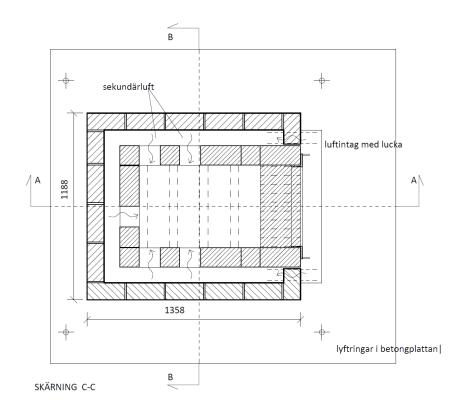
- The source for the lime...is a <u>metamorphic limestone</u>
 (<u>marble</u>) with content of calcium carbonate (mineral name: calcite) and silicate minerals like pyroxene and mica. The silicate minerals have by burning been <u>partly transformed to</u>
 <u>hydraulic minerals</u>. The calcite has by the burning been transformed to quicklime, which later has been slaked by addition of water.
- ...the strength of the hydraulic lime ... weaker than a modern NHL 2....

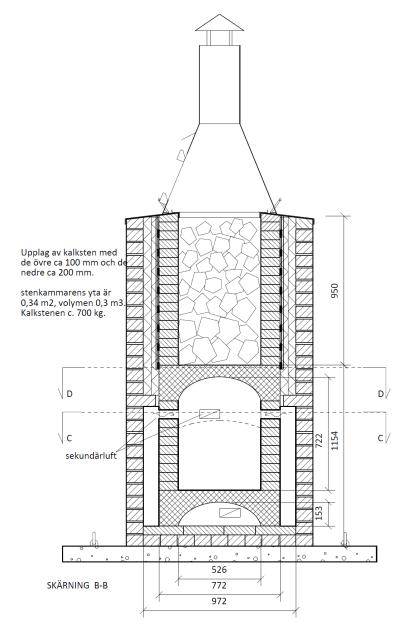
Sample 4: Lime mortar

- Binder: Slaked lime (weak hydraulic). ... a sedimentary

 limestone ... some content of clay and silt minerals have by
 burning partly been transformed to hydraulic minerals.
- Pigment: Carbon black
- Aggregates: Natural coarse-grained sand (0-5 mm), rich in clay.
- Mix proportions: <u>3 parts of slaked lime to 1 part of aggregates</u>
- Air void content: 4 vol%

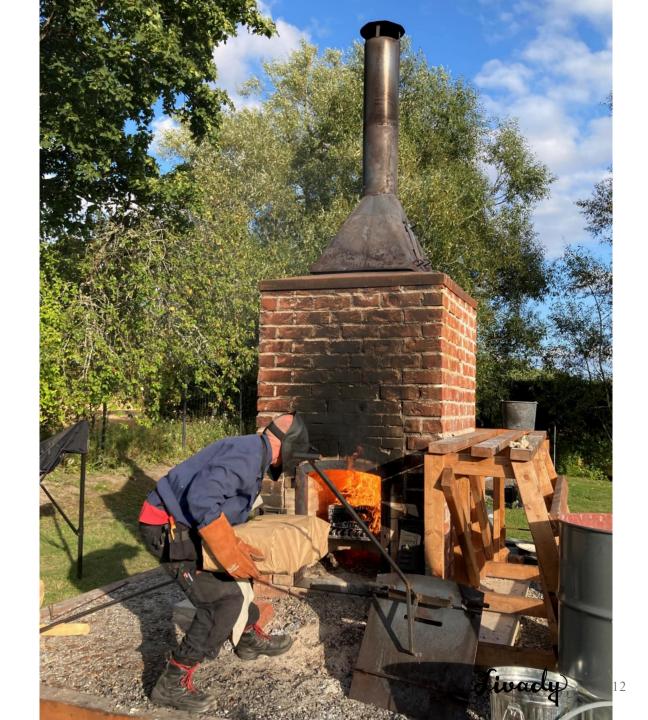
Lime kiln design 2023







Lime kiln in action



Marketing the project

Louhisaari pursuit









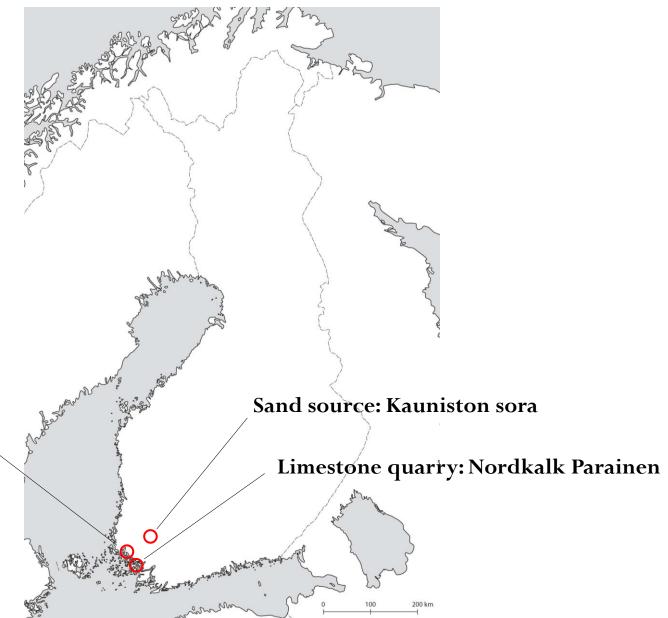


Mortar combat

Mortar making process



Locality



Louhisaari manor & lime kiln

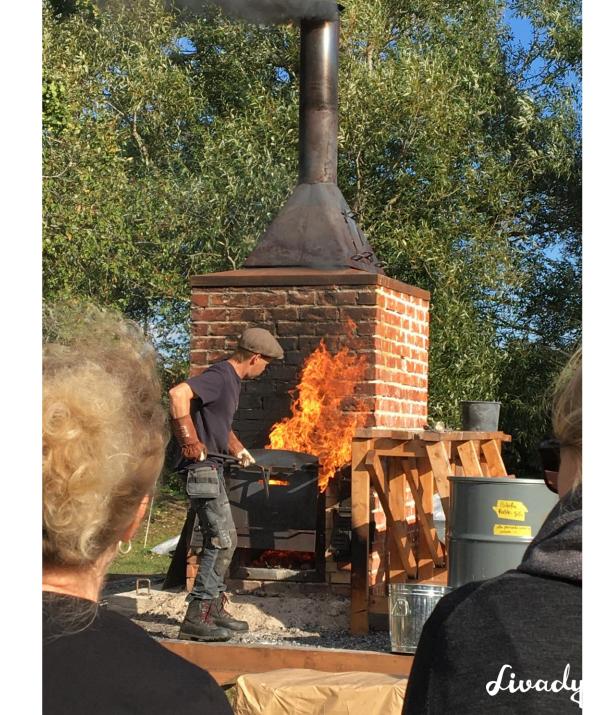
Metamorphic limestone from Nordkalk, Parainen



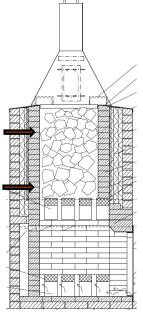


It's cooking

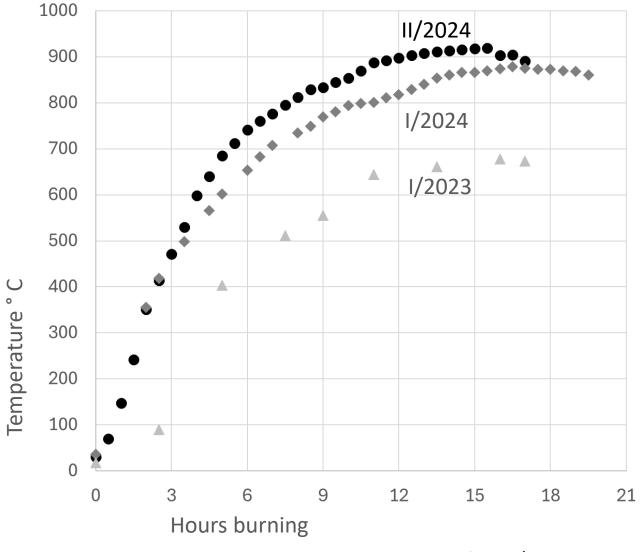




Temperature



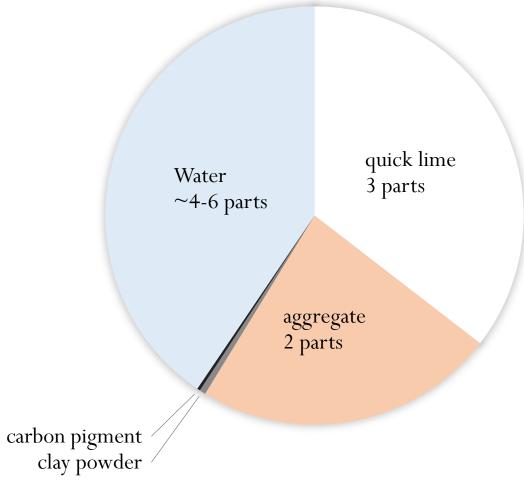


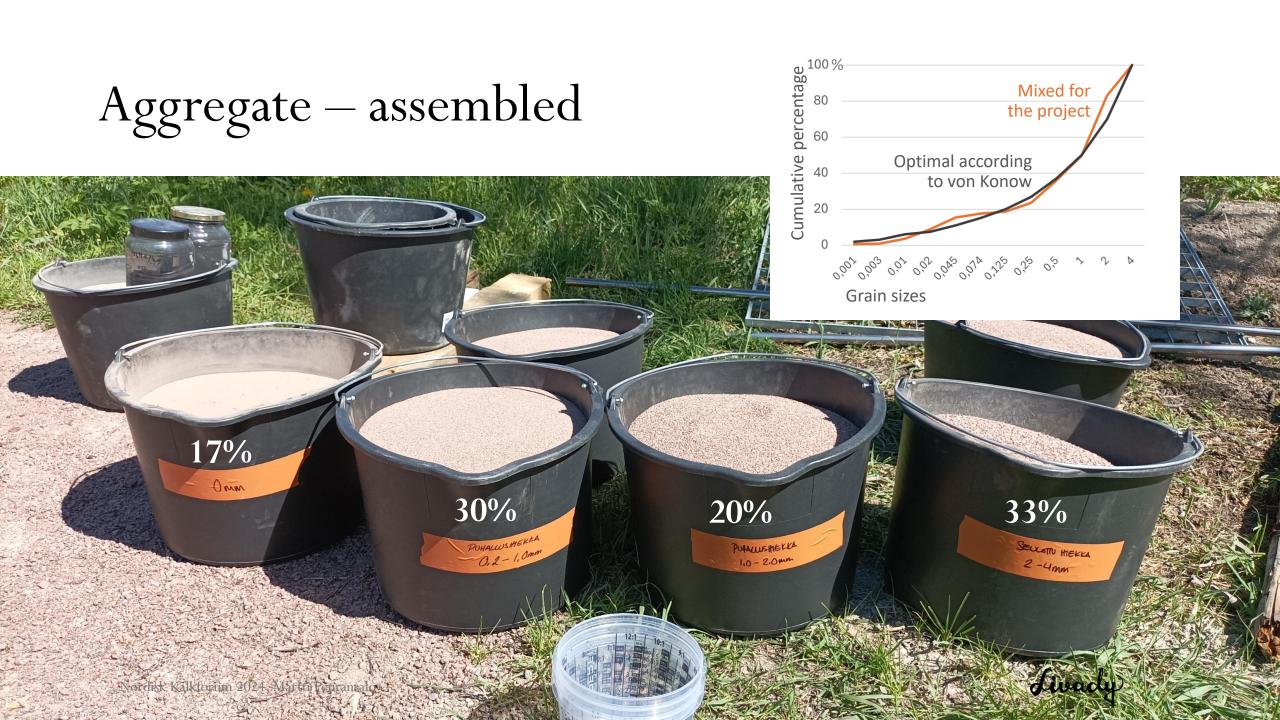


Burned limestone - quicklime



Mortar recipe – "Louhisaari Mörka"









Mixing with hand tools





Sensory evaluation





Testing and research

Defining mortar qualities



Research Program by Mikki Keltto, Mehto

Investigations of fresh mortar

Investigations of hardened mortar



INSINÖÖRITÖIMISTÖ LAURI MEHTÖ ÖY ABRAHAM WETTERIN TIE 4, 00880 HELSINKI 09 343 6080, firstname.lastname@laurimehto.fi

Client:

Senate Properties Selja Flink Construction Project Manager 18.9.2024

THE LIME MORTAR OF LOUHISAARI MANOR – RESEARCH PROGRAM

GENERAL

The research program for the lime mortar of Louhisaari Manor consist of the research instructions for fresh, unser mortar and the research instructions for set, hardened mortar. The research instructions do not express an opinion on the mixing method or the mortar recine

The mortar's recipes are based on the old historic masonry mortar of Louhisaari Manor, which has been investigated (SEIR-materialeanalyse A/S). The main goal of the research is to form a good and as weather resistant lime mortar as possible as well as to study the properties of lime mortars mixed and slaked in a variety of methods and recipes. Additionally, the goal is to compare and evaluate different test methods for pure lime mortar and to evaluate the material differences between new and historical Louhisaari Manor lime mortars.

The mortar is mainly intended to be used as a masonry mortar. The lime used as a binder in the mortar is burnt in the lime kiln of Louhisaari Manor.

The research instructions will be updated, if necessary, as the project progresses through practical experiences.

2. INVESTIGATIONS OF FRESH MORTAR

Investigations of fresh mortar are performed immediately after mixing the ready-to-use, unset mortar. These investigations consist of measurable experimental studies and sensory evaluations. These studies are conducted as os-called on-site measurements by the mortar mixer and the mason/olasterer involved in the project.

The investigations of fresh mortar provide information about the properties of the final product (hardened mortar), allowing for comparisons between different mortars batches to be formed within certain limits. For instance, practical observations have shown that the air content of fresh mortar correlates with its frost resistance, enabling a rough ranking of mortars based on their air content. Additionally, the assessment of workability is crucial for the technical success of the work. In quality assurance, the investigations of fresh mortar serve as indicators to verify if a known mortar behaves in a known manner.

2.1. Determination of the Air Content in Fresh Mortar

The determination of the air content in fresh mortar is conducted for each batch of test mortar that is mixed. The air content measurement is conducted using a Testing - air

Water content in fresh mortar



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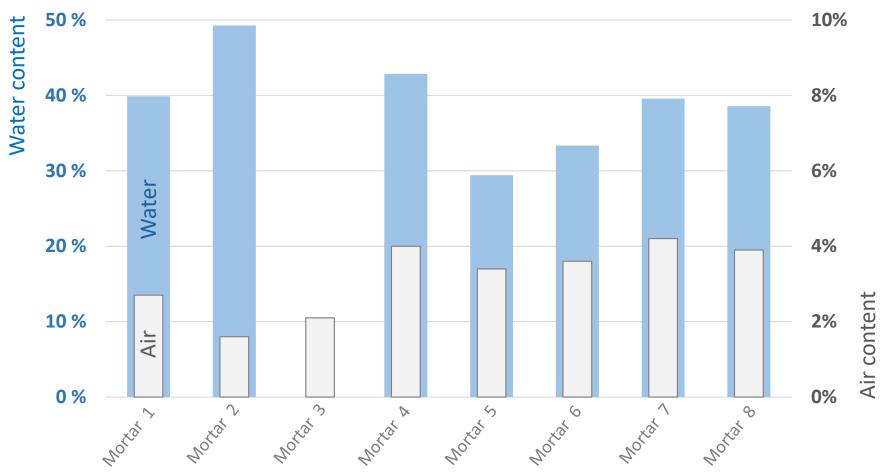
Air content in fresh mortar



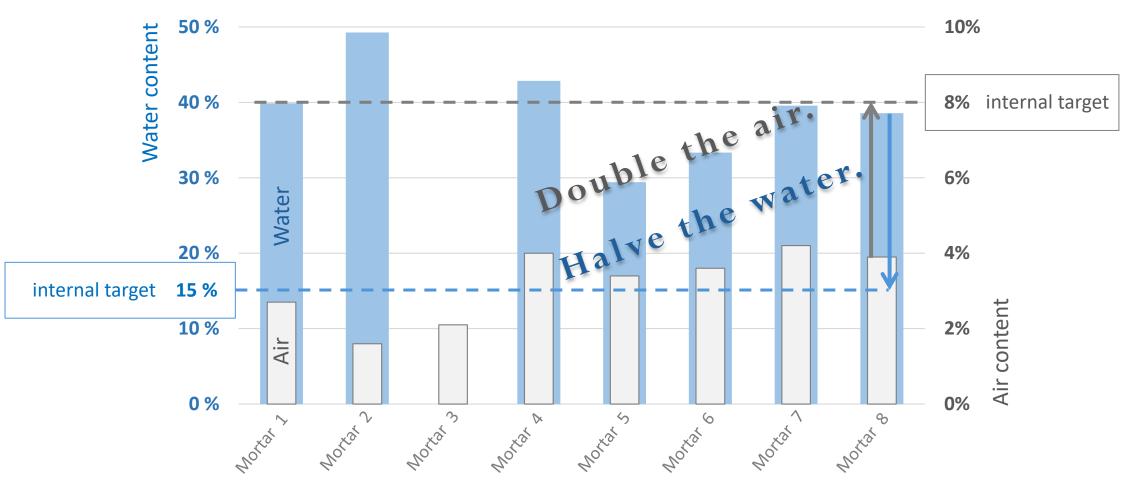
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Fresh mortar — measured results



Fresh mortar – results compared to targets



Investigations of hardened mortar

Thin Section Studies

Freeze-Thaw Tests

Determination of Porosity Values



Prism in brick mold





Cases to test further







