Natural stone projects and results in Finland

Nordic Aggregates and Stones – Information and Collaboration

18. – 19.11.2014

Trondheim
Projects on Natural stone

• “Efficient use of natural stone in the Leningrad region and South-East Finland”
  (support from SOUTH-EAST FINLAND - RUSSIA ENPI CBC PROGRAMME 2007-2013)

• “Best Environmental Practices in Natural Stone industry”
  (support from European Regional Development Fund)

• Characterization of strong weathering mechanisms to evaluate the resistance of Finnish stones in changing climatic conditions (salt frost test)
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Priority of the project: Economic development

Objectives

• To promote industrial development and cross-border cooperation across the Finnish-Russian border

• More efficient use of natural stone in city environments in the project area

Partners and budget

<table>
<thead>
<tr>
<th>Partner</th>
<th>Budget</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTK</td>
<td>486 907 €</td>
<td>51 %</td>
</tr>
<tr>
<td>Saimaan ammattikorkeakoulu</td>
<td>123 901 €</td>
<td>13 %</td>
</tr>
<tr>
<td>Open Joint Stock Company &quot;Petersburg complex geological expedition&quot;</td>
<td>168 164 €</td>
<td>18 %</td>
</tr>
<tr>
<td>Saint-Petersburg State University</td>
<td>168 164 €</td>
<td>18 %</td>
</tr>
<tr>
<td>Total</td>
<td>947 137 €</td>
<td>100 %</td>
</tr>
</tbody>
</table>
Projects on Natural stone

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Project area

FINLAND
South Karelia
Kymenlaakso
Uusimaa
North Savo

RUSSIA
Leningrad region
St. Petersburg
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Project area
Projects on Natural stone

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Themes:

Activity 1. Natural stone in city buildings - history and advantages of using local stone
Activity 2. Natural stone in environmental construction
Activity 3. Stability of a stone in the conditions of the city environment
Activity 4. Evaluation of natural stone resources in the project area
Activity 5. Development of the assessment process of natural stone occurrences
Activity 6. Recommendations for harmonization of legislative regulations in natural stone trade
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STONE TOWN GUIDE KOTKA

During the Crimean War, fought in 1853-1856, another war called the War of Aland was fought in Finland in 1854 and 1855, during which an Anglo-French fleet destroyed fortresses along the Gulf of Finland. In June 1855, the Anglo-French fleet destroyed the fortress of Kuussalimi almost completely. The few remaining structures are an Orthodox church, a few gunpowder cellars and parts of the fortress structures, for example the ruins of the Kukon and Vansaa fortresses. Finland’s National Board of Antiquities, the City of Kotka and the Ministry of Employment have renovated for example Fort Slava, Fort Elisabeth, the redoubt of Kotka and parts of Catherine’s fortress structures.
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Natural stone reserves of the project area
Projects on Natural stone

• “Efficient use of natural stone in the Leningrad region and South-East Finland”

Database

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
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<tbody>
<tr>
<td>Observation ID</td>
<td>Unique ID code</td>
</tr>
<tr>
<td>Municipality / town</td>
<td>Name</td>
</tr>
<tr>
<td>Village</td>
<td>Name</td>
</tr>
<tr>
<td>Place</td>
<td>Name</td>
</tr>
<tr>
<td>Map sheet</td>
<td>Number</td>
</tr>
<tr>
<td>Coordinates</td>
<td>Lat, Long (or X,Y)</td>
</tr>
<tr>
<td>Area</td>
<td>square meters or hectares</td>
</tr>
<tr>
<td>Topographical levels</td>
<td>lowest - highest</td>
</tr>
<tr>
<td>Exposing of the rock area</td>
<td>poorly exposed – well exposed</td>
</tr>
<tr>
<td>Quaternary coverage</td>
<td>estimated depth of coverage</td>
</tr>
<tr>
<td>Rock type</td>
<td>Rock name according to classification</td>
</tr>
<tr>
<td>Commercial name</td>
<td>Commercial name (e.g. “Baltic Brown”)</td>
</tr>
<tr>
<td>Colour</td>
<td>Name</td>
</tr>
<tr>
<td>Grain size</td>
<td>millimetres or written definition</td>
</tr>
<tr>
<td>Structure and texture of the rock</td>
<td>Geological definitions</td>
</tr>
<tr>
<td>Quarrying started</td>
<td>Starting of quarrying operations</td>
</tr>
<tr>
<td>Quarrying ended (if ended)</td>
<td>Ending of quarrying operation</td>
</tr>
<tr>
<td>Total amount produced</td>
<td>Total amount known or estimated</td>
</tr>
<tr>
<td>Quarrier 1</td>
<td>Company / state organization etc.</td>
</tr>
<tr>
<td>Quarrier 2</td>
<td>Company / state organization etc.</td>
</tr>
<tr>
<td>Quarrier 3</td>
<td>Company / state organization etc.</td>
</tr>
<tr>
<td>Reference building / site 1</td>
<td>Where the stone is used</td>
</tr>
<tr>
<td>Reference building / site 2</td>
<td>Where the stone is used</td>
</tr>
<tr>
<td>Reference building / site 3</td>
<td>Where the stone is used</td>
</tr>
<tr>
<td>Usability</td>
<td>Estimation of usability in the future</td>
</tr>
<tr>
<td>Photos</td>
<td>Link to photos</td>
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<tr>
<td>Research permit</td>
<td>No / Yes, description</td>
</tr>
<tr>
<td>Quarrying permit</td>
<td>No / Yes, description</td>
</tr>
<tr>
<td>Land ownership</td>
<td>Owner, Address</td>
</tr>
</tbody>
</table>
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• “Efficient use of natural stone in the Leningrad region and South-East Finland”
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Projects on Natural stone

• “Best Environmental Practices in Natural Stone industry”

Partners:

• The Finnish Natural Stone Association
• The Finnish Environment Institute (SYKE)
• Geological Survey of Finland (GTK)

Budget: 115 500 €

Project time: 06/2013 – 12/2014
Projects on Natural stone

• “Best Environmental Practices in Natural Stone industry”
  (support from European Regional Development Fund)

• The project deals with the main features of natural stone quarrying activities and their impact on the environment as well as the best environmental practices formed for those activities.

• The different phases and aspects of the activities are analyzed and based on this the best practices in the field of environmental improvement and environmental impact management are outlined. In particular, the necessary environmental assessments and the permitting process are analyzed.
Projects on Natural stone

• “Best Environmental Practices in Natural Stone industry”

• Natural stone production
• Legislation
• Noise
• Dust
• Tremble
• Effects to surface and ground water
• Natural stone production waste and by-products
• Radiation
• Nature values
• Landscaping and after-use
• Life Cycle Assessment
• Surveillance and reporting
• The best environmental practises in natural stone quarrying
Projects on Natural stone

• “Best Environmental Practices in Natural Stone industry”
  Published by the end of 2014
Projects on Natural stone

• Characterization of strong weathering mechanisms to evaluate the resistance of Finnish stones in changing climatic conditions (salt frost test)  
  (support from the Confederation of Finnish Construction Industries RT)

  Partners:

  • The Finnish Natural Stone Association
  • The Confederation of Finnish Construction Industries RT (CFCI)
  • Geological Survey of Finland (GTK)

  Budget: 156 000 €

  Project time: 06/2013 – 12/2014
Projects on Natural stone

• Characterization of strong weathering mechanisms to evaluate the resistance of Finnish stones in changing climatic conditions (salt frost test)
  (support from the Confederation of Finnish Construction Industries RT)

• Combined salt-frost stress on natural stone products depending on the usage
• Not required for stones that will not get affected by de-icing salts
• Update of the national application standard NAS (SFS 7017)
• Based on the standard: EN 12371
• 56 freezing / thawing cycles
• Testing the change of flexural strength and compression strength
• Compulsory from the beginning of 2017
• Also tested abrasion and slip resistance

At the moment:
  • 15 companies
  • 60 stones
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Radioactivity in construction products

- Radiation exposure comes from the ground, construction products, space and from eating, drinking and breathing
- An average annual radiation dose in Finland is about 4 mSv.
- In Finland approximately half of the radiation comes from Radon (222Rn) gas.
- Mineral construction materials contain always elements that produce ionizing radiation
- Radioactivity of house construction products is calculated with activity concentrations of Radium(226Ra), Thorium(232Th), Potassium(40K)
- For materials used for infrastructure construction is also taken into account Cesium (137Cs)
Radioactivity in construction products

- The radioactivity of materials can be presented as an activity concentration index, which for house constructions materials is calculated from the activity concentrations (Bg/kg) as follows:

\[ I = \frac{C_{\text{Th}232}}{200} + \frac{C_{\text{Ra}226}}{300} + \frac{C_{\text{K}40}}{3000} \]

- For infrastructure construction products (roads, streets etc.) the formula is:

\[ I_2 = \frac{C_{\text{Th}232}}{500} + \frac{C_{\text{Ra}226}}{700} + \frac{C_{\text{K}40}}{8000} + \frac{C_{\text{Cs}137}}{2000} \]

- For landfills and landscape construction:

\[ I_3 = \frac{C_{\text{Th}232}}{1500} + \frac{C_{\text{Ra}226}}{2000} + \frac{C_{\text{K}40}}{20000} + \frac{C_{\text{Cs}137}}{5000} \]

For cinder:

\[ I_4 = \frac{C_{\text{Th}232}}{3000} + \frac{C_{\text{Ra}226}}{4000} + \frac{C_{\text{K}40}}{50000} + \frac{C_{\text{Cs}137}}{10000} \]
Radioactivity in construction products

• Radiation protection principles

• The Basic Safety Standards directive, 13675/13 (EU)
  • Basic safety standards for protection against the dangers arising from exposure to ionising radiation
  • Each EU country must adapt the directive principles in their legislation during 4 years transition period

• In each country there is a national radiation safety authority that supervises the radiation protection regulations and work
• Public information about radiation and radiation protection
• Regulations for the work safety
  • Annual exposure
  • Protection guides

• The responsibility of the employer
  • Protection against radiation
  • Restrictions of working time
Radioactivity in construction products

• TC 351 WI 00351020

• Construction products: Assessment of release of dangerous substances — Radiation from construction products — Dose assessment of emitted gamma radiation

• Consultation among the technical committees (TC)

• Deadline for the comments 1.2.2015

• The first step of validation of the gamma radiation measurement method waiting for financing