

SCHWAN & SPEHR **energy management**

Architects & Engineers / Berlin – Lüdenscheid

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Factory Building from 1905 with historical brick façade (Leipzig), before restoration

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Factory Building from 1905 with historical brick façade (Leipzig), after restoration

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Gable view of the historical brick façade (Leipzig) after restoration

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Details of the historical brick facade after restoration

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- The interior face of the outer wall covered with 5 cm of cement-bonded wood wool panels.
- existing outer wall thickness 38,5 cm
- Single-layer masonry without air gap
- reconstructed window constructions with single glazing
- height of the room approx. 3.50 m

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- Complete installation of the wall tempering tube system before the application of the first plaster layer.
- tube system consisting of 14 mm plastic-coated copper pipes (brand Cuprotherm)
- distance between the tubes 15 cm-25 cm
- filled with water after leak tightness test

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- Convection heating Systems / Panel Radiator
- Panel Radiator with flow pipes and return pipes

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- Panel Radiator with flow pipes and return pipes

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- Insulation packaging on outer walls



- Air tight Construction

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- The interior face of the outer wall after the application of the first plaster layer. Technical function of the first plaster layer: Cement bonding bridge.
- mixture of cement, water, sand and split / Split grain size 3-5 mm

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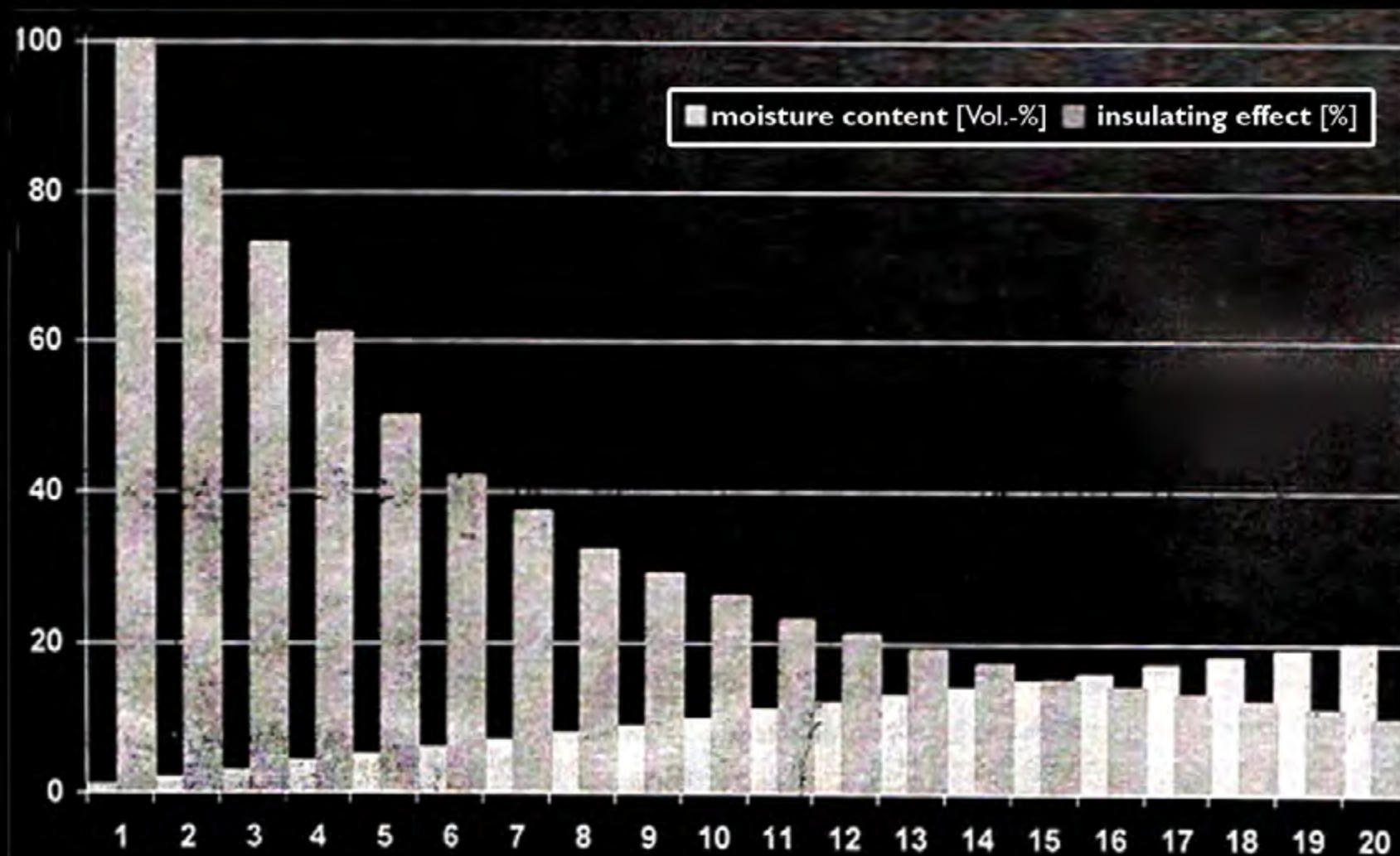
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- The interior face of the outer wall after the application of the second plaster layer.
- Material: lime-gypsum-plaster
- Energy consumption, indoor air quality, comfort and quality of life and workplace in buildings, are essentially determined by the design, the location and the place of the heating and cooling surfaces

Connection between moisture content and insulating effect with Bricks

Investigations of J.S. Cammerer who was a famous building physicist in the 60s of the last Century



- Brickstones have a material-related moisture content of minimum 5 percent by volume.
- 5 percent by volume of moisture content means 50 l of water per one cubic meters of brickstone wall
- Assuming a normal moisture content of 5 percent by volume, the diagram shows, that a perfect drying of the brickwork leads to a halving of the coefficient of thermal conductivity.
- This corresponds to an improvement of the insulation of the masonry by a factor of 2
- With other words the drying of the masonry leads in arithmetical terms to a doubling of the wall thickness

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- The plaster surface is ready. The plant is in operation.
- The objective of a wall tempering system is to warm up the inside surfaces of the outer walls on a temperature between 19°C - 21°C.
- The radiation climate
- The human body is in a permanently running process of radiation exchange with its immediate surroundings.

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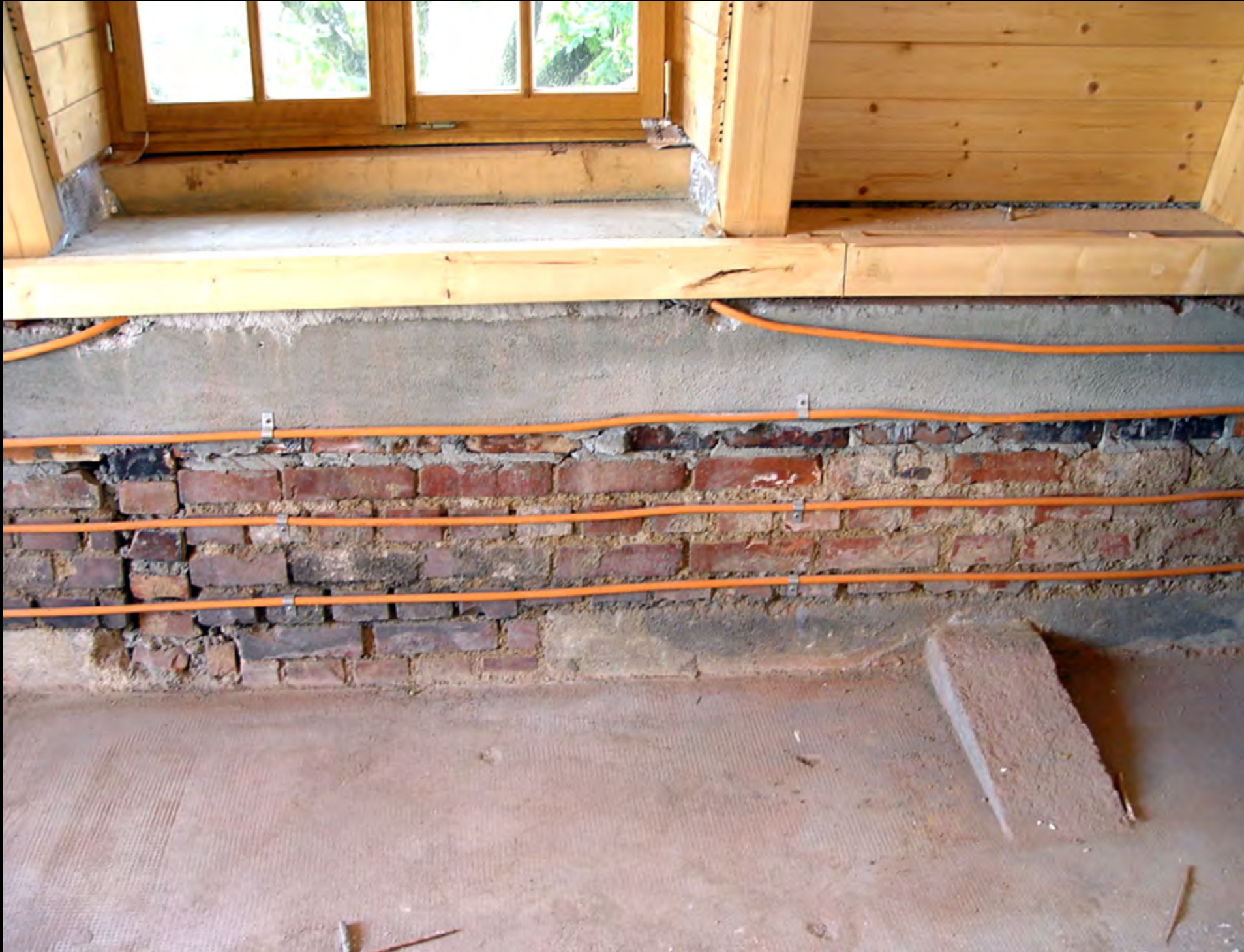
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- Reconstructed original wooden windows including the same sized window panes.
- No energy loss, because long-wave thermal radiation cannot imbue single-pane glass (greenhouse effect)

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- Tube system consisting of 14 mm plastic-coated copper pipes on bricks (brand Cuprotherm)

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- Tube system consisting of 14 mm plastic-coated copper pipes on perforated bricks (brand Cuprotherm)
- For the natural science connection between radiation exchange, heat radiation and the very directly influence to the human body, we find a new definition of indoor climate.
- The radiation climate.

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- Brick building from 1930 close to Oldenburg / Germany

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- Inside view of the kitchen before renovation
- panel radiator on the inside of the outer wall
- in the corner of the room mold growth

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- Inside view of the existing floor construction
- Panel radiator with a flow temperature of 65°C

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- Inside view of the existing floor construction
- Tube system consisting of 14 mm plastic-coated copper pipes assembled on the existing interior plaster (brand Cuprotherm)

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- Inside view of the existing staircase
- Tube system consisting of 14 mm plastic-coated copper pipes assembled on the existing interior plaster (brand Cuprotherm)

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- Inside view of the living room
- Tube system of the wall tempering system with a flow temperature of 35°C

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The position of the lines can be determined exactly with Thermal Imaging film (eg brand CPM-monitor) or an electronic cable locator

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Dust walls (eg brand „Zipwall“) allow the assembly in inhabited flats