



Bicklaying – Brick facades

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historic overview


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round 10.000- 7500 B.C.	the first known mud bricks
round 3000 B.C.	the first known burnt ceramic bricks
Roman Empire	burnt ceramic bricks and mobile kiln
12th century	brick gothic (Italy + North-West Europe)
19th century	Bull's Trench Kiln (rotating procedure)
early 20th century	the use of ceramic blocks


material


2


- 


•mudbrick (clay mud)
- 

•ceramic brick
- 

•ceramic block
- 

•concrete block
- 

•AAC block
- 


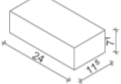


•lime-sand brick & block
- 

•insulating ceramic blocks

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brick modul systems

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<i>National standards – size, brick module</i>	<i>German brick module system DIN</i>
<p><i>e.g.:</i></p> <p><i>Austrian, Hungarian:</i>     25x12x6,5 cm</p> <p><i>British:</i>                     21,5x11,25x6,5</p> <p><i>French</i>                         22x10,5x6,5 cm</p> <p><i>German:</i>                     24x11,7x7,11 cm</p>	<p><b>Brick sizes</b></p> <div style="margin-bottom: 10px;">  <span style="float: right;">DF</span> </div> <div style="margin-bottom: 10px;">  <span style="float: right;">NF</span> </div> <p><b>Block sizes</b></p> <div style="margin-bottom: 10px;">  <span style="float: right;">2DF</span> </div> <div>  <span style="float: right;">3DF</span> </div>

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**brick module systems** 4

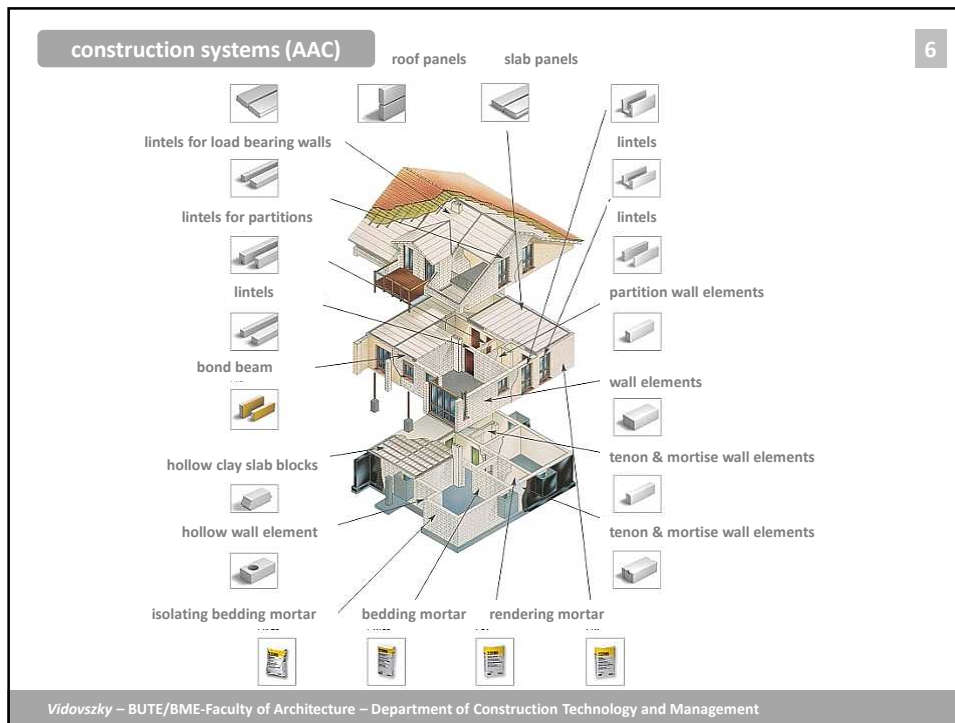
*Brick module systems*

*new Hungarian*
*old Hungarian*
*British*
*German*

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**construction systems (ceramic)** 5

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**performance of brick walls** 7

- strength – load bearing capacity
- thermal insulation capacity
- acoustic requirements
- water uptake / frost resistance
- fire resistance
- vapour transport capacity
- durability
- accuracy

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mortars
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*mortar material:*

- mud mortar
- lime-mortar
- lime-cement mortars
- cement mortar

*contents of mortars:*

- binder (lime, cement, rasin)
- aggregate (sand, stone dust)
- water
- admixtures and additives

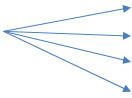



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mortars
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*Where?*  
*What purpose?*  
*What kind of building?*



*bedding*  
*interior rendering*  
*facade rendering*  
*footing zone (plinth)*

*performance of mortars:*

- strength H4, H6...H20, H40
- durability
- frost resistance
- workability
- plasticity
- thermal insulation capacity

*for restoration:*

- compatibility
- color
- desalination
- porosity
- capilar activity
- etc.

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mortars
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**application:**

*- traditional – prepared on-site*

*-pre-prepared – mixed only with water on-site*

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application
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**loadbearing walls:** outer and inner walls with load-bearing role – structures considered as load bearing ones

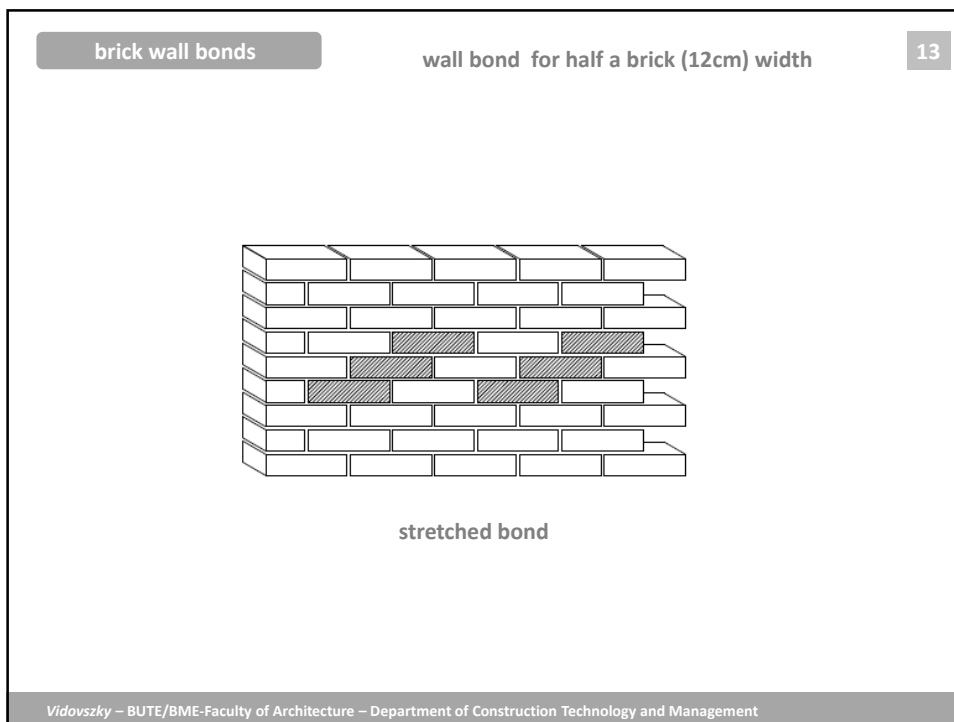
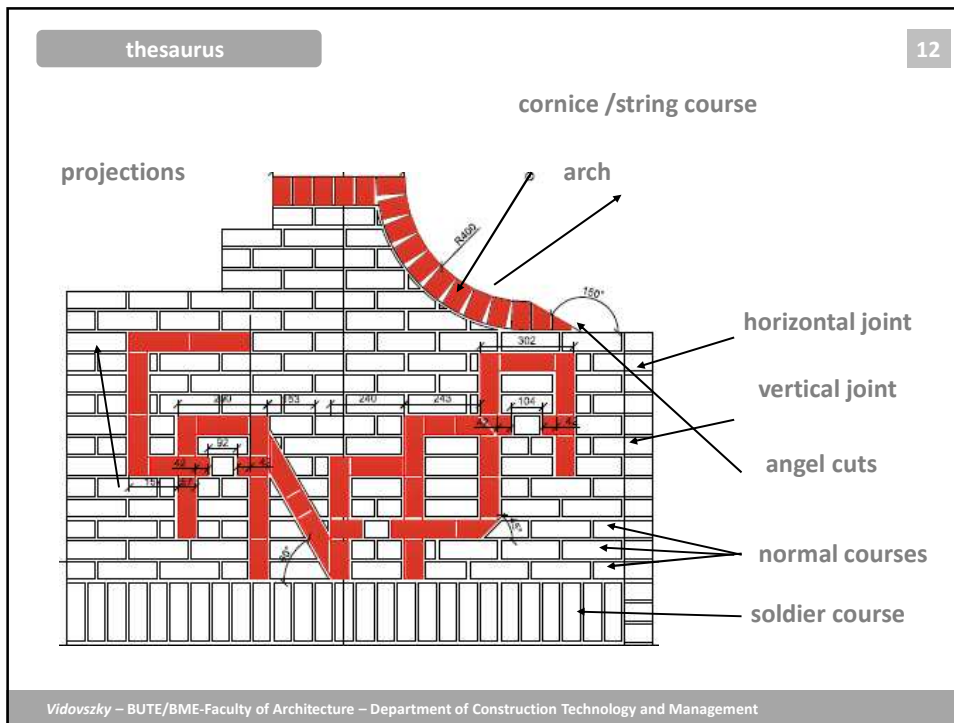
**non-loadbearing exterior walls:** self supporting structures on the facades in a case of a frame-structured building

**facade walls:** the outer layer of the wall structure – usually with a half-a brick width

**partition walls:** internal wall separating two adjoining units – between two flats acoustic performance required

**fire barrier walls:** refractory partition wall between fire sections

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**brick wall bonds** 14

wall bond for whole brick (25cm) width

The diagrams illustrate five different brick wall bonds for a 25cm wide wall:

- heading bond:** Shows a wall where every brick is laid with its long side facing the viewer (headers).
- crossbond:** Shows a wall where every second course consists of bricks laid with their long sides facing the viewer (headers).
- Dutch bond:** Shows a wall where every second course consists of bricks laid with their long sides facing the viewer (headers), and the other courses are laid with their long sides facing the wall (stretchers).
- English bond:** Shows a wall where every second course consists of bricks laid with their long sides facing the wall (stretchers), and the other courses are laid with their long sides facing the viewer (headers).
- Flamish (Polish) bond:** Shows a wall where every second course consists of bricks laid with their long sides facing the viewer (headers), and the other courses are laid with their long sides facing the wall (stretchers).

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**brick wall bonds** 15

bonds for wider walls

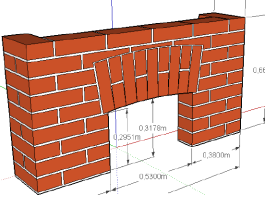
The diagrams illustrate brick wall bonds for wider walls:

- bonds for wall of 50cm width:** Shows a standard brick wall with a 50cm width.
- bonds for wall of more than 100cm width (e.g. fortification walls):** Shows a wider wall with a diagonal course of bricks. Labels indicate **bond courses** (horizontal layers) and **diagonal courses** (layers of bricks laid diagonally).

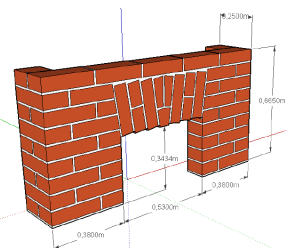
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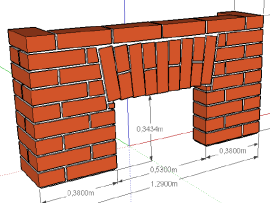
**arches** 16



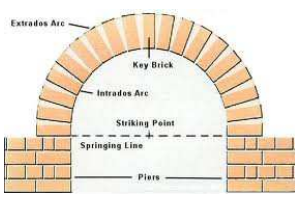
**segmental arch**



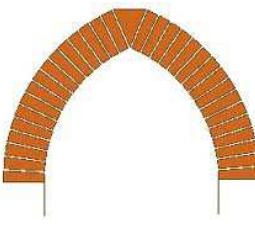
**wedged arch**



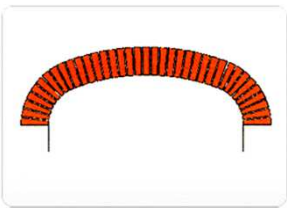
**flat arch**



**semi circular arch**





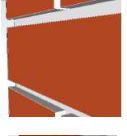

**gothic arch**



**three-centered arch**

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**brick joints - pointing** 17

**flush joints:** finish is prepared by the trowel at the time of the bedding of the bricks

**half-round (bucket handle) joints:** finish is prepared with some delay (but within the time of hardening), with special tool

**recessed /raked joints:** finish joint is raked off – final pointing executed later with the same or different (finer, color, etc.) material

**weathered /french joints:** the joint finish is inclining into the direction to the lower brick edge

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work sequence of the activity

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1. set the corner bricks & string lines
2. set the first course (dimensions, water level, etc.)
3. laying the second, third, etc. courses
4. place the lintels
5. jointing / grouting
6. surface treatment



brick walls

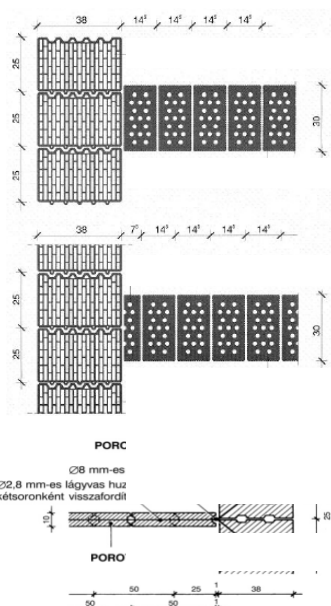


block walls

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design - execution

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dimensions: from wall surface to wall surface

wall joints: mortar bond / brick bond / bond with other material (e.g. steel wire, plate, etc.)



vertical module: the height of the brick/block

horizontal alignment: quarter of a brick/ block have to be the smallest element

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design- costs
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high accuracy ceramic blocks,  
AAC blocks

→

thin plaster layer  
+ undercoat  
+painting (coating)

clay blocks

→

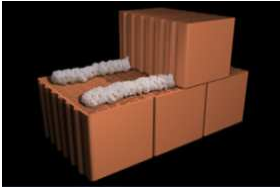
1,5cm plaster  
+ undercoat  
+painting (coating)

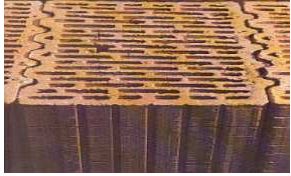
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application of modern systems
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glued joints




tenon & mortise joints



methods of mortar placement



block bond



joints with mortar „bag“

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modern brick facades

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*metal supporting system*

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1. Transportation - tracks, trailers

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**Organizational questions:**

- unit: pallet – 300-600 bricks/ 50-150 blocks
- transportation to the site: 7-12t truck (+ trailer)
- moving at the site: with pallet jack / pallet track /fork-lift truck

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1. Transportation - site logistic 24

arrangement of the palets


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handtools 25


trowels




Anglo-saxon




German




Asian




Hungarian



moulding trowel




finishing trowel



+ mason's pan

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**handtools** 27



pointing trowels  
(round/square cross section)

joint raker

jointing trowels

masons hammer


levels

string line


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**equipments** 28

temporary structures:  
- scaffolding (above 1,5m)



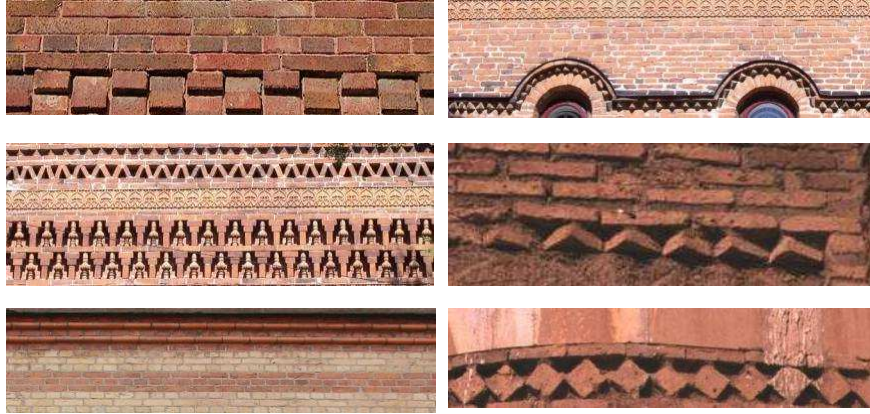
power tools:  
- (electric) brick saw  
- mortar mixer



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decoration

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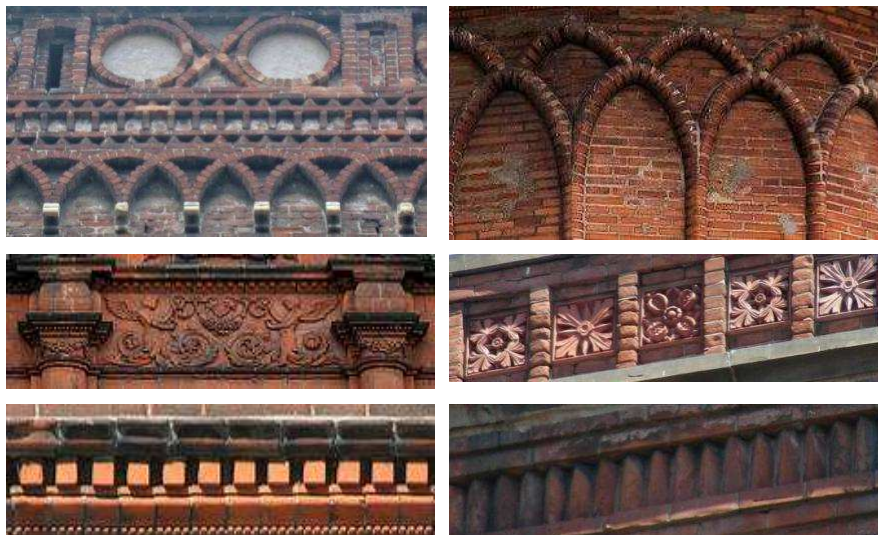


String courses and cornices

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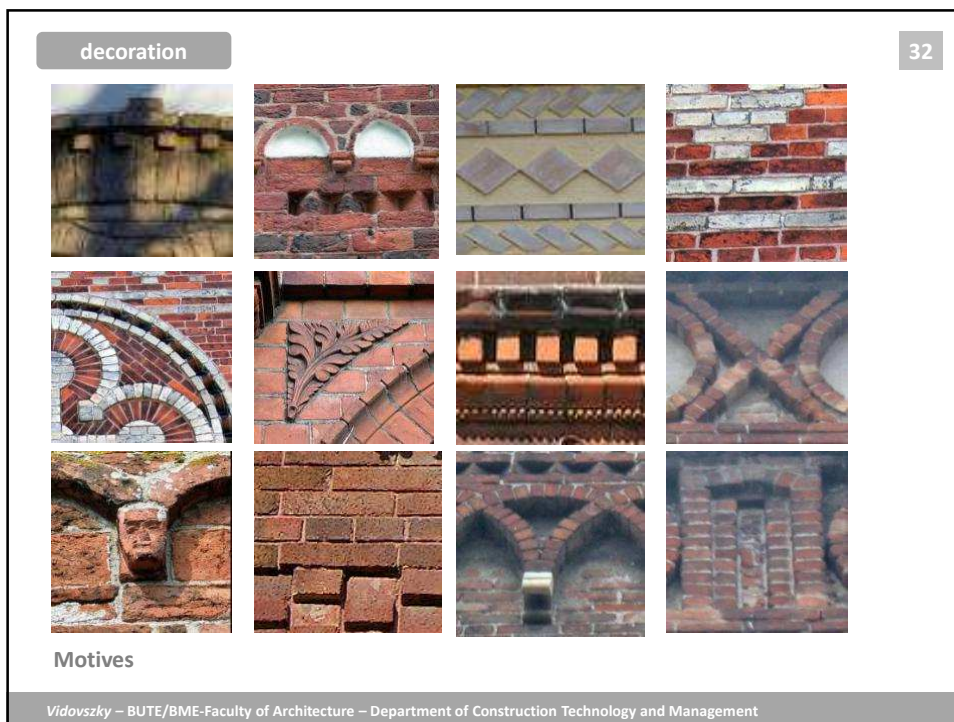
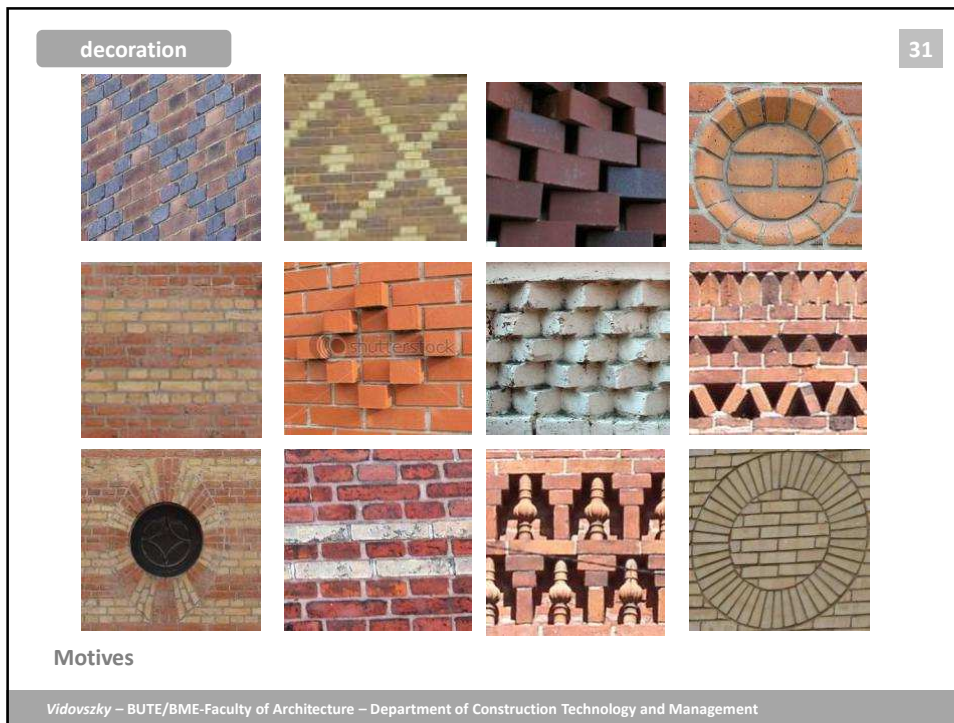
decoration

30

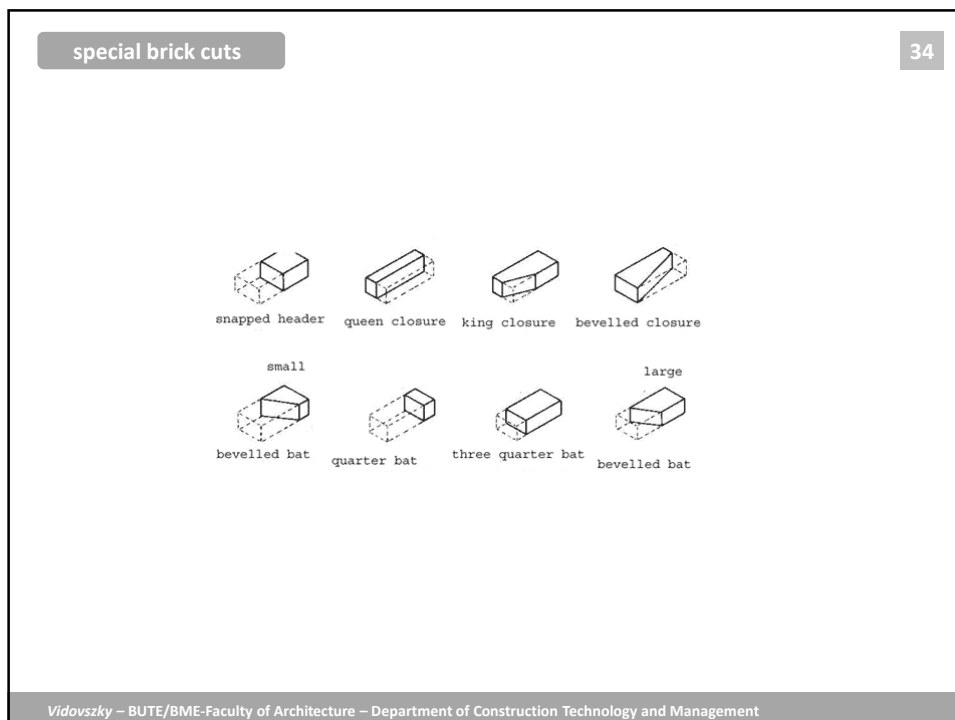
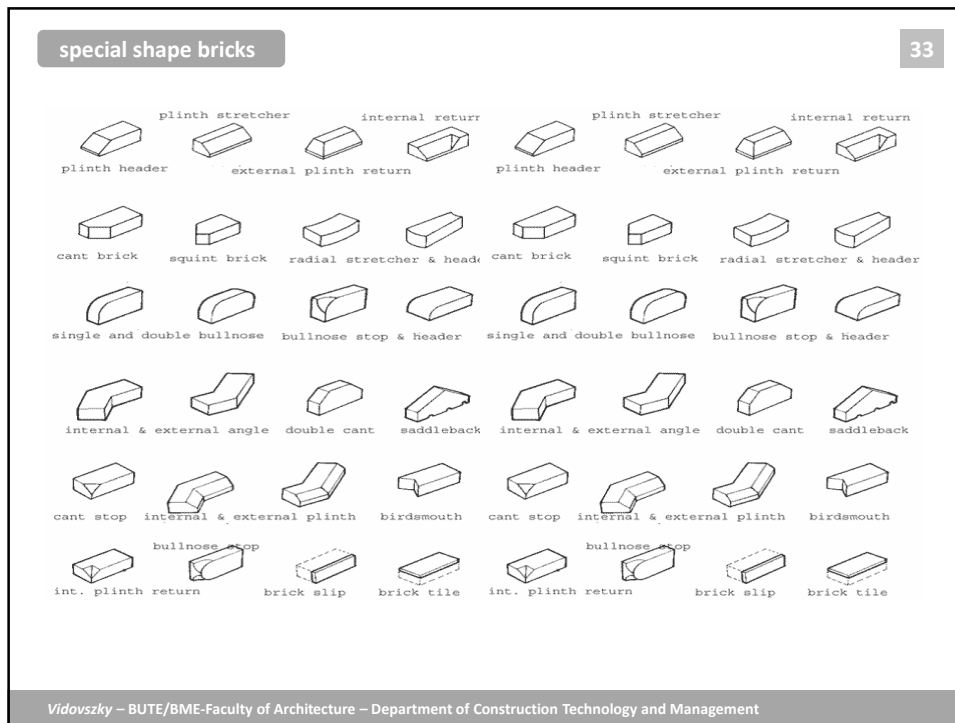


String courses and cornices

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examples

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Residential building, Horsens, Denmark

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examples

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Fence pillar, Horsens, Denmark

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examples

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Residential building, Horsens, Denmark

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examples

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Custom-house, Copenhagen, Denmark

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examples

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Central Railwaystation, Copenhagen, Denmark

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examples

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School building, Biberach, Germany

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examples

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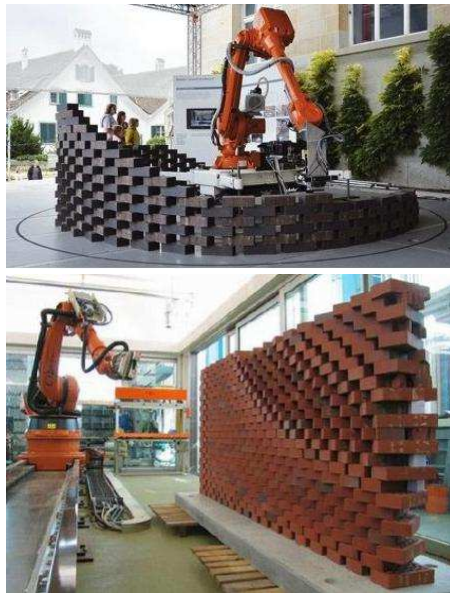


International competitions

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new tendencies

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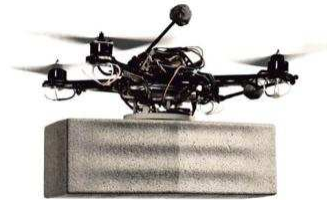
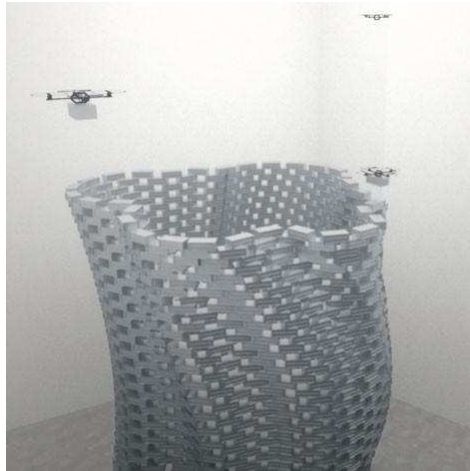


bricklayer robots

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new tendencies

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bricklayer robots

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new tendencies

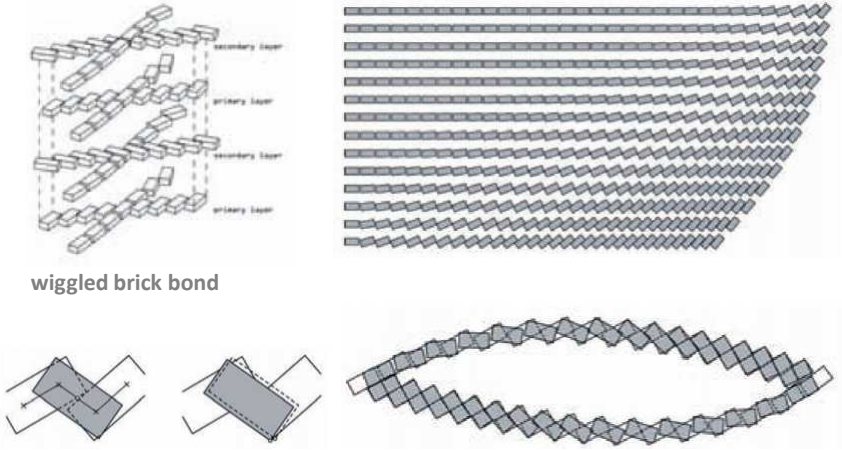
44



special architectural features

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new tendencies 45



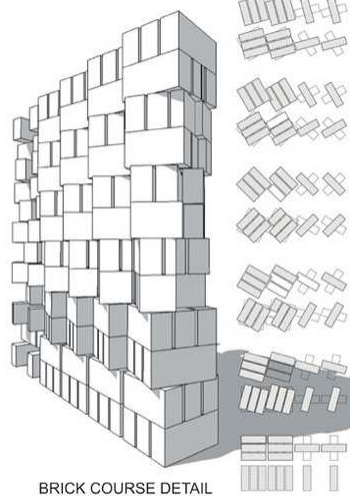
wiggled brick bond

special bond types

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The slide illustrates 'wiggled brick bond' and 'special bond types'. It features a 3D perspective view of a brick wall with wavy horizontal courses, a 2D plan view of a brick with wavy edges, and a 3D perspective view of a brick wall with a complex, undulating pattern. The text 'wiggled brick bond' and 'special bond types' are placed below their respective diagrams.

new tendencies 46



BRICK COURSE DETAIL

special bond types

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The slide shows a 'BRICK COURSE DETAIL' as a 3D perspective view of a brick wall with a complex, multi-layered structure. To the right, there are several 2D diagrams showing different brick bond patterns, including staggered and offset arrangements. The text 'BRICK COURSE DETAIL' and 'special bond types' are placed below their respective diagrams.

examples

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Brick facade, South Asian Human Rights Documentation Centre, India

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examples

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Brick facade, Apartment building, New York, USA

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examples

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Brick separation wall in a Villa in Bali, Indonesia

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Thank you for your attention!

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4

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