In the last 60 years a variety of factors resulted in radical changes in the European brick industry.

Nowadays the modern clay brick production process in western countries is an optimal mechanized and automatic process, fully controlled to get the best quality products out of the process.

The modern production processes are based on different brick shapes and colors.
BRICK MAKING IN DEVELOPING COUNTRIES

In contrast to this, the situation in developing countries, in terms of both brick making technology and the organization of the work, showed no major changes in recent decades.

And what is the situation in India?

THE INDIAN BRICK INDUSTRY

Most popular walling material (Size: 9" x 4 1/4" x 3") (23cm x 11cm x 7.6cm)

Annual production ≈ 200 billion bricks (2nd largest brick producer after China and the largest 'soft-mud brick producer' in the world)

No. of brick units > 100,000

Seasonal operation (6 to 7 months in a year)

Majority of units adopt hand-molding, sun-drying and BTK/clamp-firing process

Provides direct employment to about 11 million workers (most of them migratory)

Coal consumption > 32 mil Tons / Year (3rd largest in the world)

8 bis 10 Mio. Tonnen Biomasse

Consumption of top soil = 540 mil Tons / Year only 60cm in the depth

ca. 200 km² (50,000 acre) per year (size of Stuttgart: 207 km²)
THE INDIAN MARKET FOR BRICKS

The Indian construction industry is expected to grow at 25–30 % during the next period.

This means a structural transformation of the Indian brick industry.

It will change its face.

This will create huge opportunities for machinery manufacturers and technology providers.
THE INDIAN BRICKS INDUSTRY

Building market fast rising
Government starts controlling

Bigger production units
Mechanization of factories
Start of concentrations

THE TRADITIONAL INDIAN BRICKS INDUSTRY

MIXING
MOULDING
SHIFTING
DRYING
ENVIRONMENT
FIRING
ALSO AN INDIAN BRICK FACTORY

CLAY

MOULDING

SHIFTING

DRYING

ENVIRONMENT

FIRING

A MODERN BRICK FACTORY

MIXING

GRINDING

MOULDING

SOFT MUD

EXTRUDING

DRYING

ENVIRONMENT

FIRING
**PROCESS TECHNOLOGY**

- Automatic
- Semi automatic
- Fully mechanized
- Partially mechanized
- Purely Manual

**THE LINK BETWEEN PROCESS TECHNOLOGY AND PRODUCTIVITY**

<table>
<thead>
<tr>
<th>Nature of processing method</th>
<th>Requested number of workers for producing 1 million standard bricks per year</th>
<th>Number of standard bricks per worker per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purely manual</td>
<td>20</td>
<td>50 000</td>
</tr>
<tr>
<td>Partially mechanized</td>
<td>14</td>
<td>71 400</td>
</tr>
<tr>
<td>Fully mechanized</td>
<td>6</td>
<td>166 700</td>
</tr>
<tr>
<td>Semi-automatic</td>
<td>1</td>
<td>1 000 000</td>
</tr>
<tr>
<td>Automatic</td>
<td>0,25</td>
<td>4 000 000</td>
</tr>
</tbody>
</table>
ECONOMIC AND SOCIAL ASPECTS

Factories are usually located in rural areas (close to raw material supplies).

They generally employ local labour, often for generations, and so help stabilise local communities.

EXTRACTION OF CLAY

The product properties and the quality are determined by the raw material.

The extraction of clay is in most cases directly connected to the production process.

Little waste results in changing quality of bricks.
CLAY

A GOOD CLAY is necessary for making QUALITY BRICKS

- Use of surface soil is not recommended.
- Nature takes about 1 million years to make 10 inches of top soil.
- Use of this surface soil for brick manufacturing destroys it permanently.
- This adversely affects the cultivation of the land, the flora and fauna and the environment around.
- More ecologically worthwhile is digging in the depth

CLAY QUARRY
A GOOD AND CONSTANT CLAY MIXTURE is necessary for making QUALITY BRICKS.
Alternative Preparation of “easy clay”

Box feeder → Disintegrator → Double shaft mixer → Extruder

CLAY

PREPARATION OF CLAY
**HAND MOULDING**

Manual process, Clay/water mix, in a mould

Hand moulding can simply be partly mechanised for equal quality

**MACHINE MOULDING OF BRICKS**

Machine bricks

There are two types of bricks

Semi hand moulded bricks

De Boer Press
EXTRUDER MOULDING

EXTRUDED HOLLOW BLOCKS

- Light weight
- Thermal insulation
- Grip holes
- Cheaper masonry
- Less raw materials
- Less fuel
EXTRUDED HOLLOW BLOCKS

„Take architects and constructors (or researchers) into the boot“ to create the right design for

• Thermal Insulation
• Noise Protection
• etc.

SIMPLE EXTRUDER MOULDING in rural areas
SIMPLE EXTRUDER MOULDING in rural areas

BADLY PREPARED CLAY in rural areas

Take care of preparation
## WELL PREPARED CLAY in rural areas

- **Raw Material Conditions, Requirements, Shapes to be Produced**
- **Methods, Processes**

<table>
<thead>
<tr>
<th>Raw Material Conditions</th>
<th>Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing of cohesive bodies</td>
<td>+ + + + + + + + +</td>
</tr>
<tr>
<td>Processing of low-plasticity bodies</td>
<td>+ - + - + - + - -</td>
</tr>
<tr>
<td>Bodies with high water content</td>
<td>+ + - - + - + -</td>
</tr>
<tr>
<td>Bodies with low water content</td>
<td>- + x - + + + +</td>
</tr>
<tr>
<td>High compact stability</td>
<td>x - + x - - - +</td>
</tr>
<tr>
<td>Processing of deaerated masses</td>
<td>x - - - - + + +</td>
</tr>
<tr>
<td>Uniform compaction</td>
<td>+ - x - - - -</td>
</tr>
<tr>
<td>High throughput</td>
<td>+ - - - - - -</td>
</tr>
<tr>
<td>Low piece numbers, non-standard</td>
<td>+ + + + + - -</td>
</tr>
<tr>
<td>Certain texturation (lamination) allowed</td>
<td>+ + + - - -</td>
</tr>
<tr>
<td>Texturation undesirable</td>
<td>+ - - + + +</td>
</tr>
<tr>
<td>Products display with high dimensional accuracy</td>
<td>+ - - - - -</td>
</tr>
<tr>
<td>Smooth surface</td>
<td>+ - - - - -</td>
</tr>
<tr>
<td>Rough surface</td>
<td>+ + + + + +</td>
</tr>
<tr>
<td>Masses blocks</td>
<td>+ + + + + + +</td>
</tr>
<tr>
<td>Tiles</td>
<td>+ + + + + + +</td>
</tr>
<tr>
<td>Extrudes products (pipes, hollow bricks)</td>
<td>+ + + + + + +</td>
</tr>
<tr>
<td>Compacts for presses and rollers</td>
<td>+ + + + + +</td>
</tr>
<tr>
<td>Roofing tiles or tableware</td>
<td>+ + + + + +</td>
</tr>
<tr>
<td>Hollow-ware</td>
<td>+ + + + + +</td>
</tr>
<tr>
<td>Tableware</td>
<td>+ + + + + +</td>
</tr>
</tbody>
</table>

### Notes:
- **+** = applicable
- **-** = inapplicable
- **x** = conditionally applicable
LABORATORIES PLAY AN IMPORTANT ROLE IN IMPROVING THE PRODUCT QUALITY

- Testing facilities with trained staff members in the factory
- Laboratory kiln for testing purposes in the factory
- External laboratories with scientific background
"TECHNOLOGY" INSTITUTES CAN HELP

- knowledge source for specific industrial branches
- high-tech solutions for practical situations
- easy access for small industries
- training for operational staff
- bridge between Industry and Science
- pre competitive research and development
- better use of industrial R&D resources
- easier international contacts
- representative of industry to the government

"SHELTERED" PRODUKTION
for "ALL SEASON" PRODUCTION
Thank you for your kind attention.

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