Brick Industry & My Journey

Hand Made

Soft-mud Moulding

Hollow Blocks

Extruded Wire Cut

O P Badlani
Chairman
Prayag Clay Products Pvt Ltd, Varanasi
Highlights

- Introduction to Prayag Clay Products Pvt Ltd
- Transformation to New Technology
- My Experience shared
- Natural Draught Zigzag Technology
- Future Planning
Prayag Clay Products was founded in 1937 in Varanasi, Uttar Pradesh.

At present Prayag Clay Products operates three brick production units in Varanasi (India) and produces following products:

- Traditional Bricks (Hand moulded)
- Machine made Solid bricks
- Modular Bricks
- Hollow blocks
- Decorative Clay tiles (Roofing n wall cladding)
- Clay Pavers (Flooring)
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1937</td>
<td>Prayag Clay products founded in Varanasi. First unit began production in 1938</td>
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<tr>
<td>1978</td>
<td>Established second manufacturing facility in Varanasi</td>
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<tr>
<td>1999</td>
<td>Established third manufacturing facility in Varanasi</td>
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<tr>
<td>2001</td>
<td>Shifted from Fixed chimney Bulls trench technology to High Draught Zigzag firing technology</td>
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<td>2003</td>
<td>Installed first brick extrusion machine for mechanizing the Moulding process</td>
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<td>2006-08</td>
<td>Shifted all three kilns to Natural Draught Zigzag Technology</td>
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<td>2009-10</td>
<td>Started production of decorative tiles and clay pavers</td>
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<td>2010-11</td>
<td>Installed India’s first Soft Mud Moulding machine for production of mechanized solid bricks</td>
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<tr>
<td>2013</td>
<td>Installed Extruder for first unit for production of hollow blocks</td>
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Developed the Prayag Natural Draught Zigzag Technology and successfully converted all the 3 high draught Zigzag kilns to work on natural draught.

The converted kilns have been measured as lowest SPM emitting kiln by independent agencies.

Established a training institute (NeBriTA) for training and dissemination of technology:
- More than 100 kilns successfully converted in India
- Training Programmes for brick kiln owners and workers
Zigzag movement of air

- Increases the air path and turbulence
- Better heat exchange: Increase in heat transfer rate due to higher turbulence.
- Results in complete combustion of fuel.
- Helps in uniform temperature across cross section
- Cleaner combustion: Better mixing and increase in the retention time of volatile materials in the firing zone.

Draught created naturally with chimney

Around 150 kilns operational in India
3.1. Advantages of Zigzag firing technology over FCBTK

A detailed performance monitoring study was undertaken by a team from Greentech Knowledge Solutions, Enzen Global Solutions, University of Illinois, and Clean Air Task Force to measure the performance of FCBTK and Zigzag firing brick kilns. The monitoring was carried out during 2011 and 2012. The results of the 2011 study are available in the form of a detailed report on the website of the United Nations Environment Programme (UNEP).\(^2\) As per the assessment, the main advantages of Zigzag firing technology over FCBTK are listed below.

1. **Lower energy consumption and savings on energy cost**
   One of the main advantages of a Zigzag kiln is its lower specific energy consumption (SEC) as compared to that of FCBTK. The Zigzag kilns have SECs in the range of 0.95–1.20 MJ/kg fired brick. On an average, in comparison to conventional FCBTK, Zigzag kilns require about 20% less energy (Figure 6).

2. **Better environment performance**
   The concentration of SPM emissions in Zigzag kilns during monitoring ranged from 30 to 260 mg/Nm\(^3\) (Figure 7). Apart from SPM emissions, a Zigzag kiln

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\(^2\) [http://www.unep.org/ccac/Portals/24183/docs/Brick_Kilns_Performance_Assessment.pdf](http://www.unep.org/ccac/Portals/24183/docs/Brick_Kilns_Performance_Assessment.pdf)
Towards Cleaner Brick Kilns in India

Figure 6  Range of specific energy consumption of FCBTK and Zigzag kiln
Figure 9 Class-I brick production percentage in FCBTK and Zigzag kiln
emits 20% less CO$_2$ emissions and 75% less BC emissions as compared to those of an FCBTK (Figure 8).

3. **Higher percentage of class-I bricks**

A significant advantage of using a Zigzag kiln is the production of a higher percentage (80%–90%) of class-I bricks as compared to that of FCBTK (50%–60%) (Figure 9). An increase in the proportion of higher quality product results in an increase in the revenue for the brick-kiln owner and acts as a major incentive.
Towards Cleaner Brick Kilns in India

Figure 8  Range of black carbon emissions in FCBTK and Zigzag kiln
1.5 kg x 8 spoon/min = 12 kg/min x 2
Firemen = 24 kgs/min

0.4 kg x 8 spoon/min = 3.2 kg/min
Temperature Measurement & Control
NDZZ – Feeding & Smoke
### Retrofitting from FCBTK to Natural Draught Zigzag

<table>
<thead>
<tr>
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<th>FCBTK</th>
<th>NDZZ</th>
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<tbody>
<tr>
<td>Annual Production</td>
<td>40 Lakh Bricks</td>
<td>40 Lakh Bricks</td>
</tr>
<tr>
<td>Coal Consumption per Lakh Bricks</td>
<td>16 MT</td>
<td>12 MT</td>
</tr>
<tr>
<td>Ist Class Bricks</td>
<td>60%</td>
<td>80%</td>
</tr>
<tr>
<td>Coal Savings Total</td>
<td></td>
<td>160 MT</td>
</tr>
<tr>
<td>Extra Ist Class</td>
<td></td>
<td>8 Lakh Bricks</td>
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</tbody>
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Cost of Retrofitting from FCBTK to Natural Draught Zigzag – Rs.10–15 Lakhs

Saving of Approx 160 MT coal & an Extra 8 Lakhs of Ist Class Bricks will even out the Retrofitting cost within the first year itself.
Training Programme – Varanasi
Training Programme - Snapshots
Training Programme - Nepal
Training Programme – Bihar State Pollution Control Board
प्रयावरण व ऊर्जा बचाव की जिक-जैक तकनीक
जिज्ञासा विधि अपनाएं, मुनाफा कमाएं

वाराणसी (एमसीटी). वर्तमानशी कंपनियां में मुनाफा कमाते हैं तो आरक्षीकरण एक विधि है जिसे निर्विवाद मात्र से प्रयुक्त किया जा सकता है। प्रयुक्ती द्वारा सृजन किया जा सकता है कि किसी के प्रस्ताव को अस्वीकार करने में कोई मदद नहीं होती।

शासकों के अनुसार, यह विधि उनके प्रयोग के लिए बहुत उपयोगी है।

राष्ट्रपति सहारा 16-04-2013

जिज्ञासा विधि से सालाना 40 लाख
कमा सकते हैं ईट-भट्टा मालिक

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Set up a dedicated Clay Hollow Block Plant at Varanasi with complete automation in

- A. Clay preparation
- B. Clay Shaping by Extrusion
- C. Automatic Drier
- D. Tunnel Kiln
Challenges

- Traditional market of Solid Bricks
- Lack of knowledge – Manufacturer & Consumer
- Lack of Technical Support
- Lack of Government Support
- Huge investment in Plant & Machinery
THANK YOU

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VARANASI, INDIA

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