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Clay Brick Future

Presentation from M/s Keller HCW

AGM 2014
Clay Brick Association
South Africa

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Agenda:

1. Brief introduction of Keller HCW
2. Brick industry in South Africa
   Products and applied technology today
3. External forces on the brick industry
4. Comparison of different alternatives
   1. Reference clamp kiln
   2. VSBK
   3. Tunnel kiln
5. Introducing new products
6. Summary and outlook

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KELLER HCW

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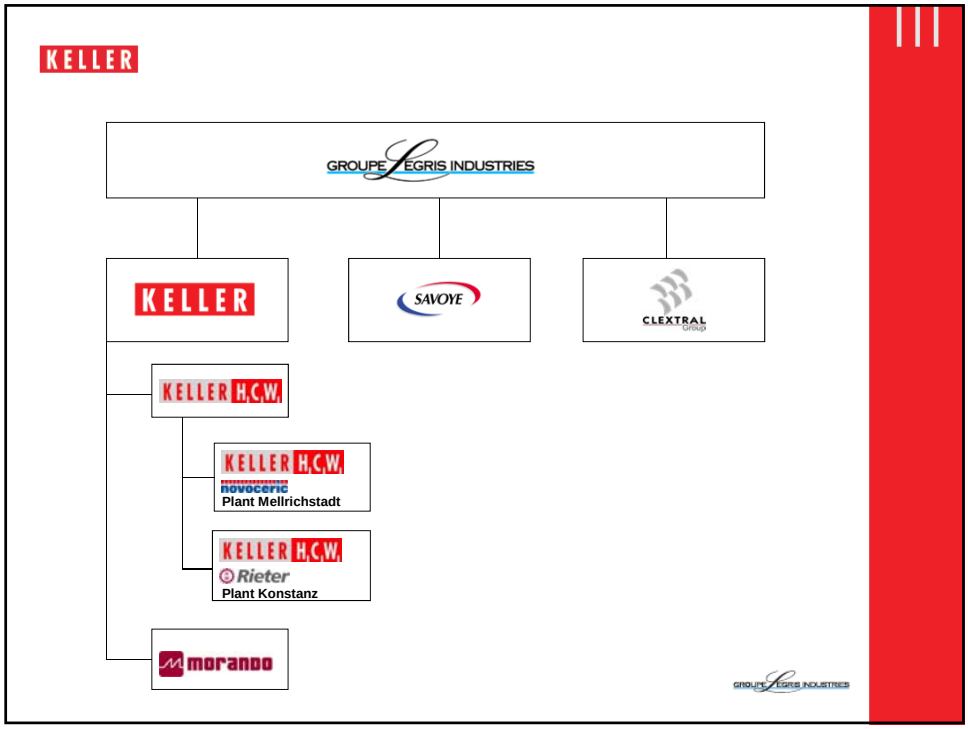
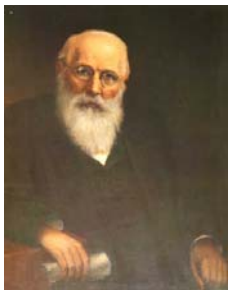
1. Brief introduction of Keller HCW



History and philosophy

- KELLER HCW, Morando and Rieter were each founded more than 100 years ago
- We build more than 1200 complete plants and many individual solutions
- We are the only combination of suppliers for turnkey plants from the quarry to packed products on the yard
- We develop economical solutions for ***existing*** and ***new*** plants by using most efficient components for body preparations, handling, drying and firing



Carl Keller 1847 - 1932

Manufacturing range KELLER HCW

- Machines and plants for the heavy clay industry
- From the individual machine up to the turnkey plant
- Quarry exploration – Material analysis
- Engineering of „your“ machinery or plant according to
- economic and ecological aspects
- One contact person during erection and commissioning period
- Training of your staff
- After-Sales Service – 24h Hotline by the
- Automation and system technology
- Measuring and control technology

Manufacturing range novoceric

- **Optimization and development of your plant on site**
- **Handling systems**
  - individual solutions – also for difficult conditions
- **Grinding systems**
  - for many building materials
- **Handling technology**
  - innovative robot technology
- **Integrated in the KELLER SERVICE NETWORK**
  - 24h Service – Training – Assistance on site

KELLER Manufacturing range morando

- Preparation and shaping technologies
- Clay analyses in the own laboratory
- Process optimization
- Service worldwide – KELLER SERVICE NETWORK
- Shaping solutions for all kinds of products
- All Machines are equipped with automation systems of KELLER HCW

KELLER Manufacturing range Rieter

- Worldwide service for clay preparation and shaping machines - KELLER SERVICE NETWORK
- Professional spare part management
  - 24h emergency service
- Plant optimization on site
- Local service and training of your staff for optimization of productivity
- Preventive maintenance

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2. Brick industry in South Africa
Products and applied technology today

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Products in South Africa

Face brick	Stock brick	Paver
FBS FBX FBA	NFP NFX E	PA PB

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Applied technology

120 manufacturers

36 fixed kilns
(of which are 20 tunnel kilns)

Mostly face bricks and pavers

84 clamp kilns
(TVA, zig zag etc.)

Mostly stock bricks

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3. External forces on the brick industry

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External forces on the brick industry

Due to environmental issues / pollution the clamp kiln production is under threat.

The cement industry and others will take over the market for stock bricks.

The brick industry finds environmentally friendly ways of production that are accepted by the authoroties.

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4. Comparison of different alternatives

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Reference clamp kiln

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Costs for running a clamp kiln

Running costs per Mio. bricks: **258,265 SAR**
Fuel consumption per Mio. bricks: **268,600 SAR**
526,865 SAR

Reference!

DETAILS:
2.95 MJ /kg coal consumption as middle of 1.7 and 4.2 MJ / kg
Coal with 28MJ/kg

2,95 MJ/kg * 1,000,000 Bricks *3 kg/Brick /28 MJ/kg =316,071 kg Coal

With 850 SAR / ton coal -> 850 * 316 = 268,600 SAR for coal per mio. brick

Cost for running a clamp kiln without fuel consumption and without costs for fork lift, water cart, grader etc.

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Change from clamp kiln production to VSBK

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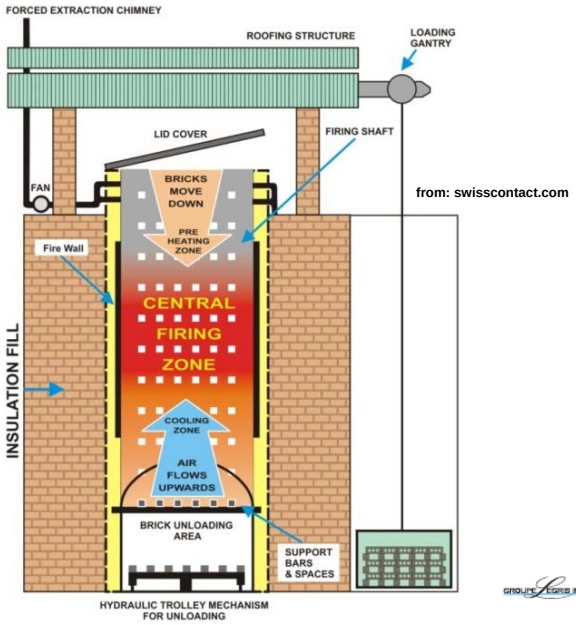
What is a VSBK?



from: swisscontact.com

Capacity and investment

Capacity of one VSBK: **150,000 Bricks/month**

Investment of one VSBK: **500,000 SAR**

Energy consumption of different kilns

Production Mechanism	Firing Energy Required (per Kg of fired brick)
Tunnel kiln	1.65 – 2.1 MJ/Kg
Transverse Arch kiln	2.0 – 4.0 MJ/Kg
Clamp kiln	1.7 – 4.2 MJ/Kg
VSBK Worldwide	0.84 – 1.1 MJ/Kg
SA-VSBK (Langkloof Bricks)	0.85 MJ/Kg and still improving!
	from: swisscontact.com

Tunnel Kiln
today usually between 1.25 and 1.46 MJ/kg
that is 300 kcal/kg and 350 kcal/kg gross (firing only).
From that approx. 100- 150 kcal/kg waste heat recovery to be used for drying.

Cost for running a VSBK

Cost for running a VSBK per Mio. bricks:	**258,265 SAR**
Fuel consumption:	**77,400 SAR**
Capital cost:	**50,000 SAR**
	385,665 SAR

DETAILS:
Running costs estimated similar to clamp kiln production.
Fuel consumption calculated with 0.85 MJ/kg.

Capital cost for VSBK	
Number of VSBK's to produce 1.05 Mio. bricks / m	7
Investment of VSBK in SAR	3.500.000
interest rate	8,00%
Write off in years	10
interest	23.333
write off	29.167
SUM	52.500
per million brick	50.000

Pros and cons of the VSBK

PROS

1. Reduction in energy consumption
2. Reduction in emmission
3. Improved health and safety in workplace

CONS

1. Investment
2. Limited product range
3. Limited achievable quality

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Change from clamp kiln production to tunnel kiln

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Tunnel kiln for the production of stock bricks?

Economical?
Feasible?

Tunnel kiln costs

A tunnel kiln for bricks with South African size

Capacity of 1000 to /d: **~8.2 Mio. €**
Or 10 mio. bricks of 3kg per month

VSBK's for 10 Mio. b/m: **33.3 Mio SAR =** **2.7 Mio. €**

Running cost for a tunnel kiln

Cost for running tunnel kiln		
Variables	Investment of kiln in Euro	8.200.000
	Investment of kiln in SAR	119.720.000
	Factory hall and utilities	50.000.000
	Investment	177.920.000
	interest rate	8,00%
	Write off in years	10
	fuel costs per brick (1.65 MJ/kg)	0,15
	cost per kWh in SAR	1
	kWh per ton of fired material	12
	capacity per annum	120.000.000
	staff for production	876.000
	maintenancem per annum in % of investment	3,00%
running cost of kiln		
	fuel cost	18.032.143
	electricity cost	4.320.000
	staff	876.000
	Maintenance	3.591.600
	interest	14.233.600
	write off	17.792.000
	SUM	58.845.343
	per Million brick	490.378

Comparison of running costs per million bricks

Clamp kiln	VSBK	Tunnel kiln
526,865 SAR	385,665 SAR	490.378 SAR

Pros and cons of the tunnel kiln

PROS

1. Reduction in energy consumption
2. Reduction in emmission
3. Improved health and safety in workplace
4. All types of products
5. Highest achievable quality
6. Produce new products

CONS

1. Higher Investment

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5. Introducing new products

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Introduction of new products as exchange for stock bricks

Currently available

Introduction of new products as exchange for stock bricks

Example for a new product

Comparison of existing stock bricks and new stock bricks

	length in wall in mm	thickness of wall in mm	height in wall in mm	weight in kg	volume in dm³	density in kg/dm³	coverage in 1/m²	weight per m²	weight per m² 102 mm thick wall
Stock brick standard	222	102	73	3,00	1,65	1,81	52	156,0	156,0
maxi brick	222	114	90	2,50	2,28	1,10	35	87,5	78,3
New stock brick	300	122	250	7,00	9,15	0,77	12,8	89,6	74,9

New stock brick has:
- **Lowest density**
- **Lowest weight**
- **Best insulation value**

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That means:

Lowest weight and density
-> lower fuel consumption
-> lower manufcaturing costs
-> lower price per m² wall

High accuracy of product
-> less mortar
-> faster brick laying
->less costs for building up walls

High insulation value
-> less costs for heating / cooling the house

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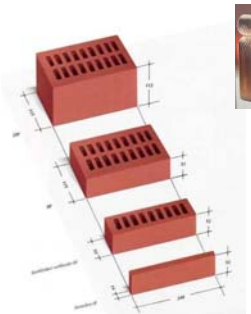

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Further products: face brick slips and panels

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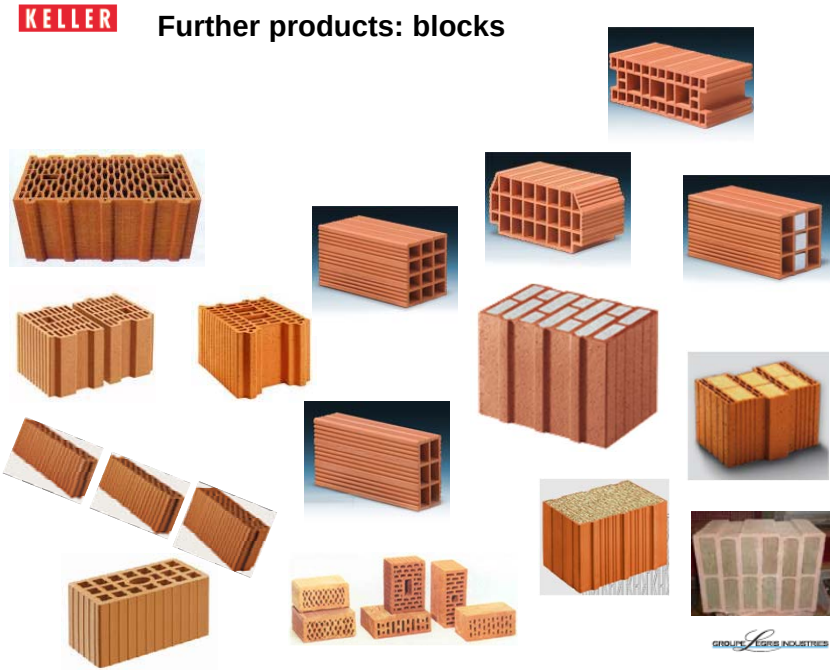
Further products: blocks



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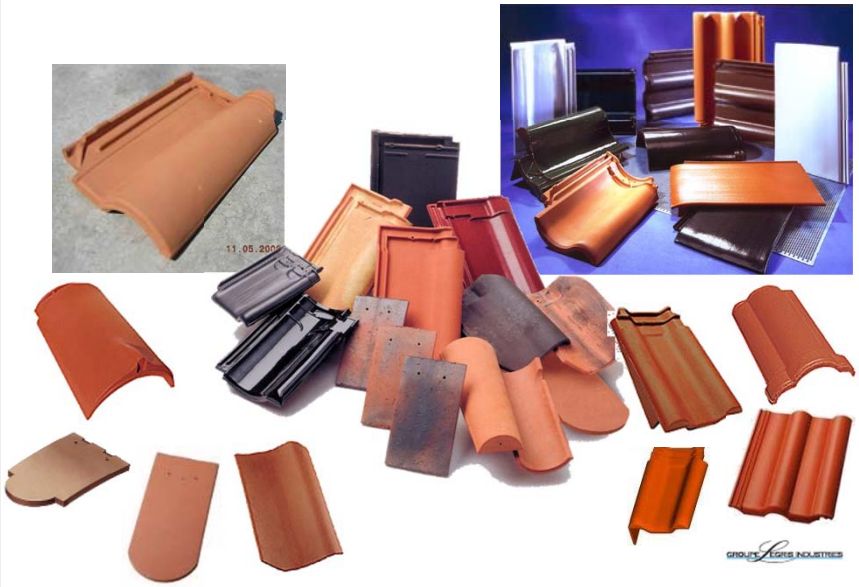
Further products: roof tiles



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6. Summary and outlook

Summary and outlook

- Due to environmental issues the brick production will change. It is not known when.
- Brick industry must look into alternatives for the clamp kiln production of stock bricks.
- Alternatives are VSBK‘s and tunnel kilns.
- We believe that tunnel kilns with artificial dryers are the better option because of
  - Independency of climate and weather
  - Higher capacity than VSBK
  - Better quality of products
  - Any kind of stock brick/plaster brick/block can be produced.

Summary and outlook

Keller HCW is very keen in finding brick makers interested in

1. developing cost effective tunnel kilns for the production of todays stock bricks.
2. introducing of new products in the market.
3. automating brick cutting and laying on kiln cars / dryer cars (setting machines)

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Thank you
and
enjoy your AGM!