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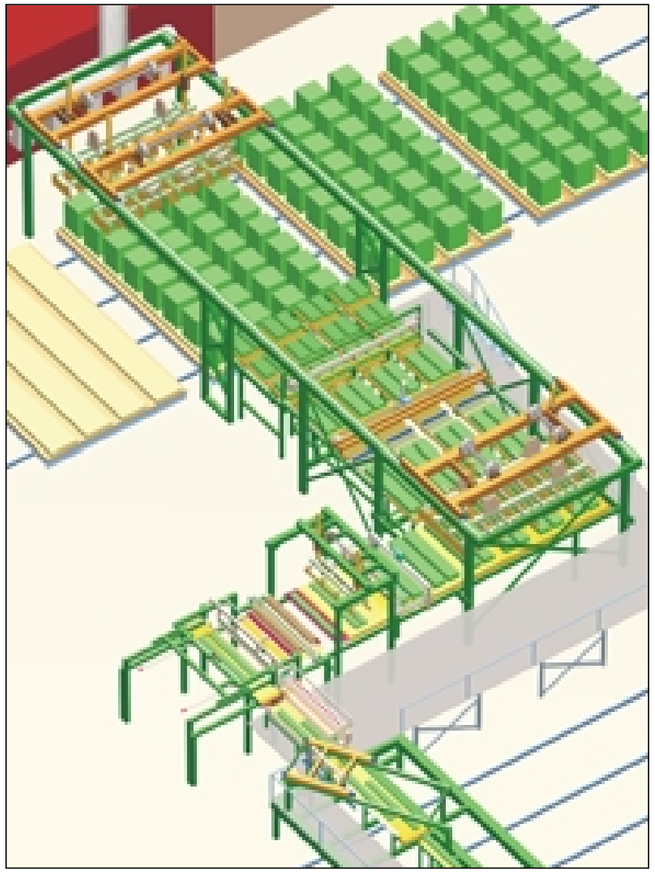
Triangle Brick Co.
Merry Oaks Works II



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Triangle Brick Co. Merry Oaks Works II

Simple solutions and high output

A good example of simple solutions – flexible and with high output – is the new stiff extrusion plant of the Triangle Brick Co. in Merry Oaks, North Carolina, a subsidiary of the Röben Tonbaustoffe GmbH in Zetel, North Germany.
With the commissioning of this plant, the production capacity of the company has increased, especially for the reference sizes Modular, Utility and Queensize, by 100 million units to 240 million facing bricks per year, making it the second largest brick manufacturer in North Carolina – the nation's number one brick manufacturing state.
According to their President Pat Brown, with this 28 million dollar investment Triangle Brick has reacted to the increasing popularity of brick in the U.S.A., to the anticipated continuation of the building boom, especially in North Carolina, and to the growing demand resulting from their own marketing programme.

Merry Oaks Works II was erected as a free-standing unit adjacent to the older plant, which was also equipped by Lingl. Lingl's scope of delivery starts with the foundations for the machines, the dryer and the kiln, and comprises all machinery and plant following the shaping section. According to Triangle Brick the tunnel kiln in this plant is one of the largest ever built in the U.S.A.

A technical innovation here is the very simple, compact and yet flexible dehacking system, with which – among other things using two industrial robots – the mixing-in of individual rows and sorting of the products at high capacity are possible.
The plant employs 40 people, producing in two shifts on five days per week.

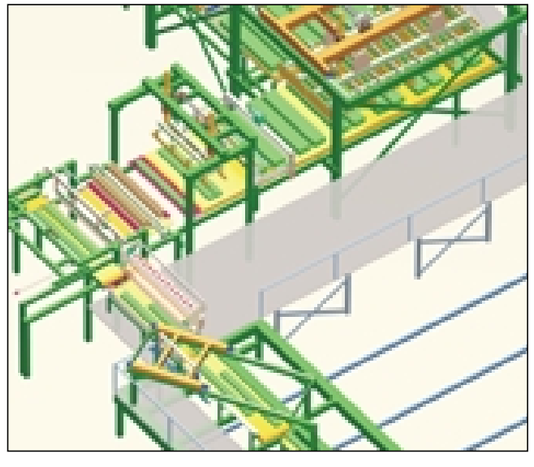
The production process

Raw material extraction and preparation

The Triassic shale is very hard and dry. Powerful crawler-type tractors with rippers break the material loose in the ground, blend and push it together into a large stockpile. A track-mounted front-end loader loads the material into tractor-trailer dump trucks for delivery to a primary jaw crusher. This crusher can handle over 150 tons per hour.
The material then goes into intermediate storage. The storage building contains enough raw material to produce 8 million bricks, which equals two weeks' production at each plant.
A further size reduction is carried out with the help of a J.C. Steele hammer mill 36-24 A, which handles the entire grinding process and meets the entire production requirement of the plant in a single shift operation. The clay powder is then stored in five silos with a capacity of 65 tons each.

Shaping

In the mill room a Steele 88 C feeder takes ground material and green scrap and feeds this mixture to the Steele 90 BD pug sealer, which is coupled to the Steele 90 AD extruder. This combination blends in the mixing water (16 percent), de-airs the body and produces at a rate of just under 40,000 standard bricks per hour (stiffness of the body 4-4.5 kg/cm^2).



The continuously formed clay column is cut off initially at a length of 18 feet and measures 8" x 4" in cross-section. The column is chamfered and provided with a textured surface. The clay slugs are doubled up adjacent to each other and cut exactly to size in a push-thru multi-wire cutter.

Grouping and setting

The double rows of green bricks are then stacked one above the other with a gripper and fed to a transfer gripper.

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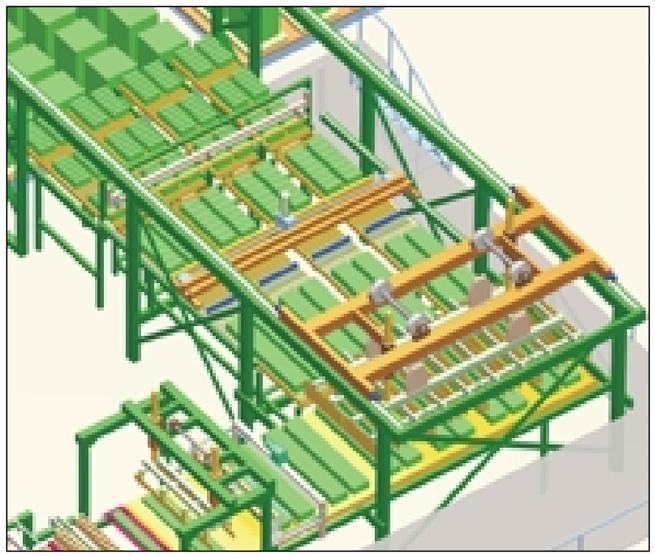
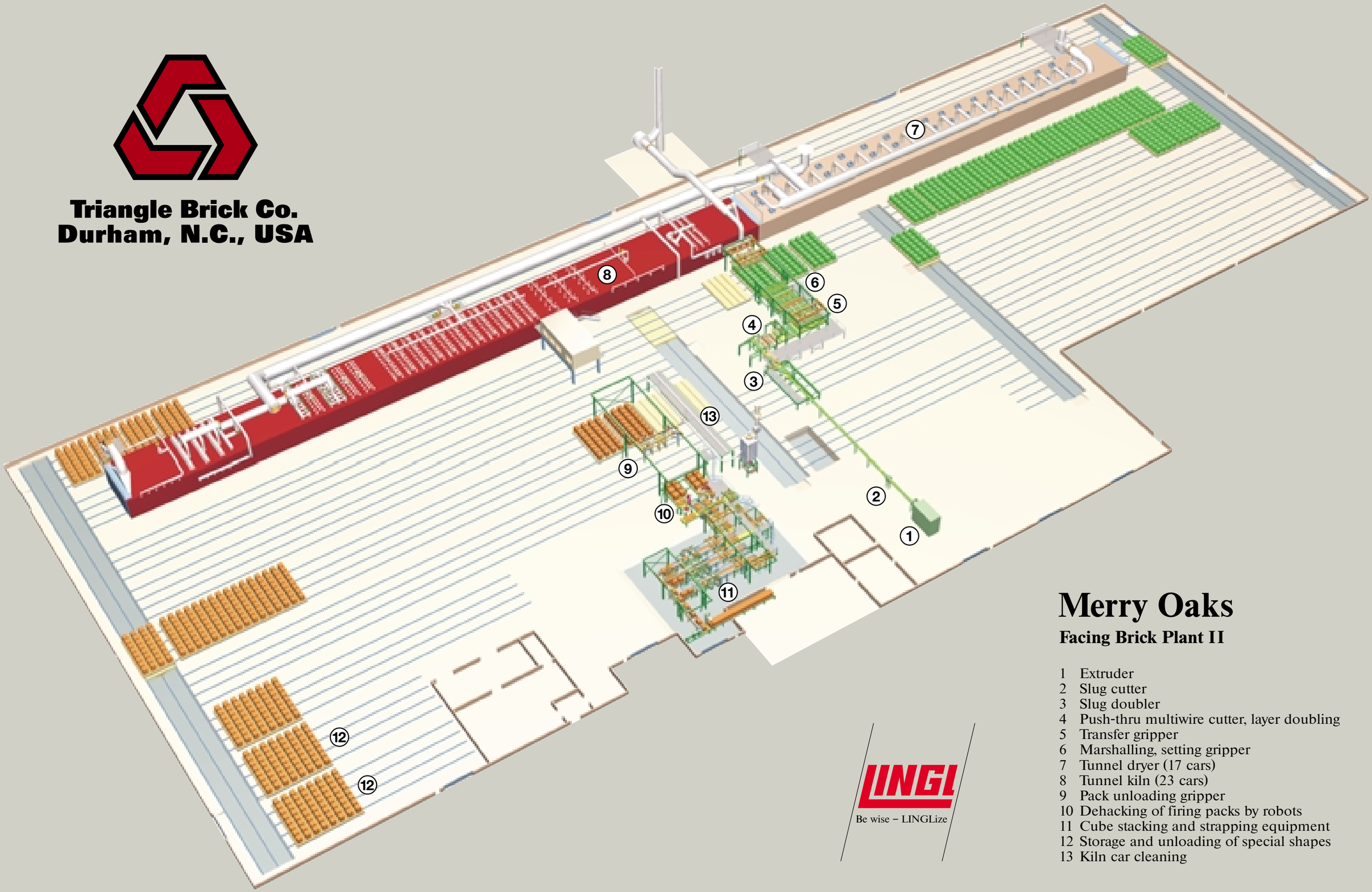


The transfer gripper picks up eight double rows and transfers them onto four marshalling conveyors, where they are grouped and held in position for the setting plant.

A setting gripper stacks the green bricks layer by layer in a cross-wise bond to form 8 x 4 firing packs on the kiln car.

Triangle Brick Co.
Durham, N.C., USA



Merry Oaks

Facing Brick Plant II

1 Extruder
2 Slug cutter
3 Slug doubler
4 Push-thru multiwire cutter, layer doubling
5 Transfer gripper
6 Marshalling, setting gripper
7 Tunnel dryer (17 cars)
8 Tunnel kiln (23 cars)
9 Pack unloading gripper
10 Dehacking of firing packs by robots
11 Cube stacking and strapping equipment
12 Storage and unloading of special shapes
13 Kiln car cleaning

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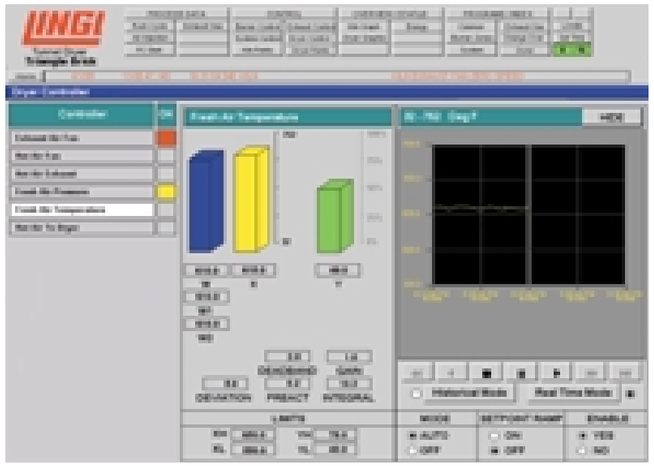
Drying and firing

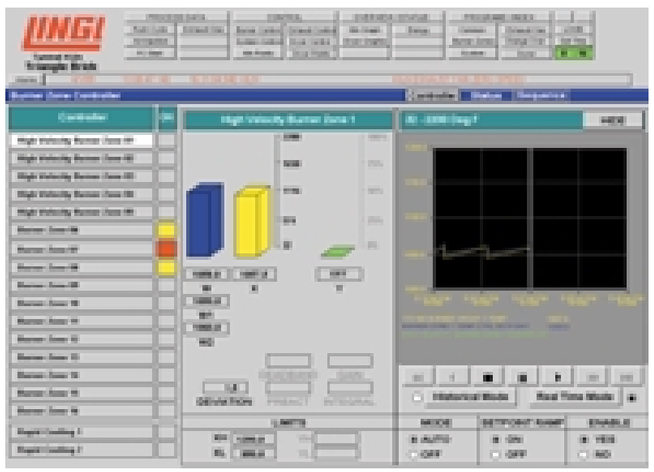
Passing through a holding room the loaded tunnel kiln cars enter the 92 m long, single-track tunnel dryer, which is arranged „in line“ in front of the tunnel kiln and can hold 16 cars. The drying time is 24.4 hours.

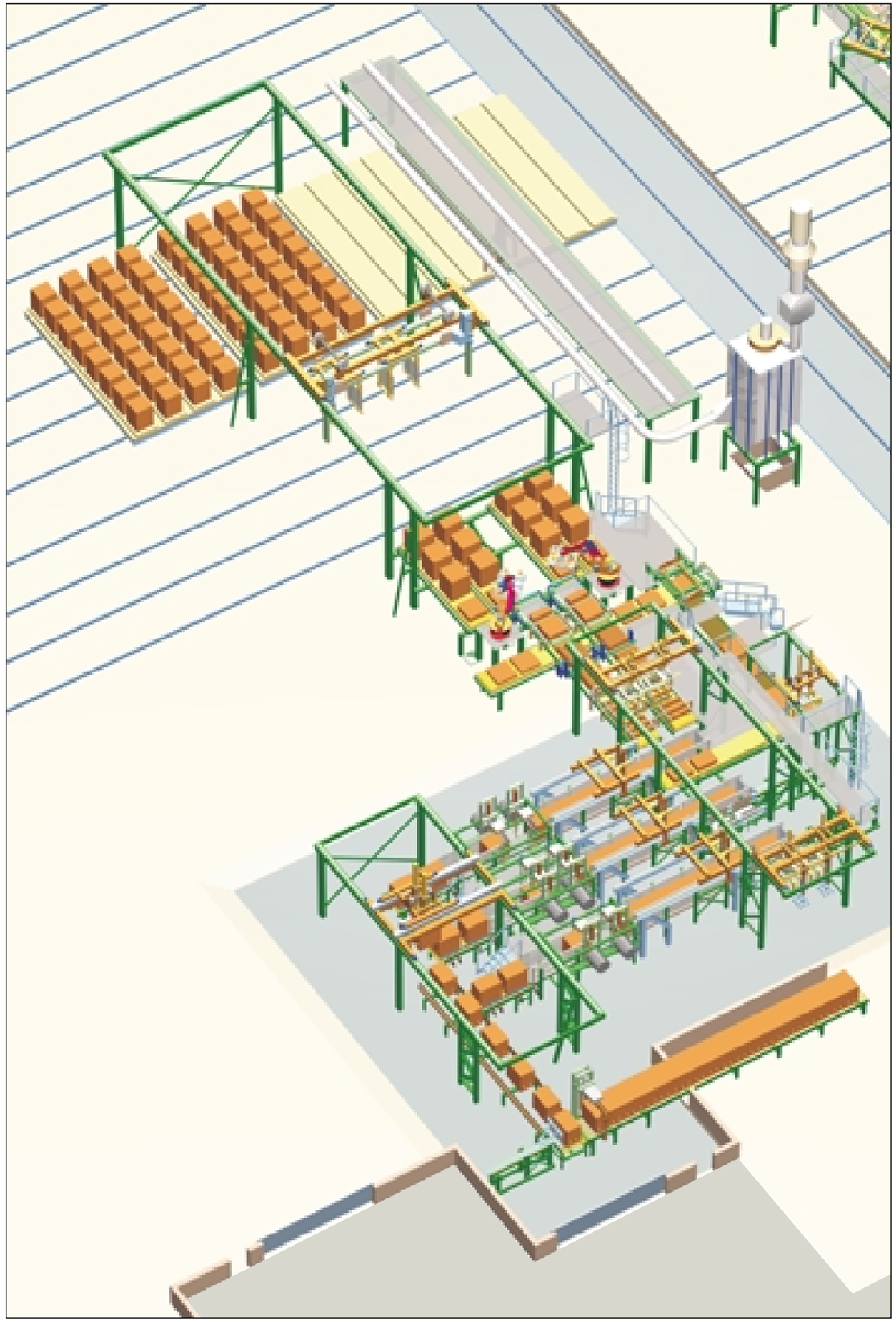
Through a door at the end of the tunnel dryer the cars pass into the approximately 124 m long tunnel kiln, designed for a daily capacity of 500 t, which is fired with top burners fueled with natural gas. The firing channel is 8.6 m wide and 1.3 m high and contains 23 kiln cars. The bricks are fired at 1100 °C, mostly flashed.

Flashing, with which dark brown and black colours are achieved, occurs in the last firing phase. Here large amounts of raw gas without oxygen are introduced into the kiln. As a result the iron contained in the clay body is reduced and changes its colour from red to black.

The passage time through the kiln takes around 33 hours. Should the price of natural gas increase, the system can be converted to less expensive oil firing.







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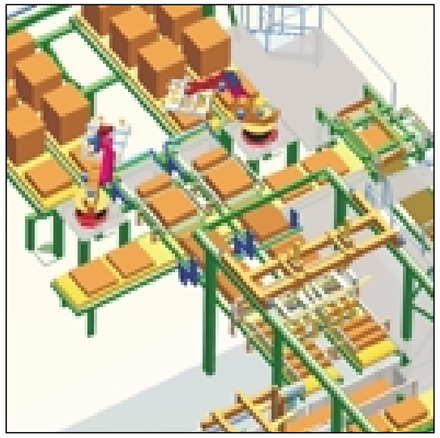
Dehacking and blending

The tunnel kiln cars leaving the kiln are guided by programme control onto the storage tracks to await dehacking. Pack grippers unload the kiln cars. They pick up whole packs and set half-packs down onto each one of four feed conveyors, which then transport them into the action radius of two dehacking robots. These robots lift up double layers of the packs and transfer them to two set-down points.

If the bricks are fired with flashing effect, the two uppermost coloured layers are set down on mixing tables located behind the set-down points. Using a pusher, each of the following layers is then supplemented by a row of coloured bricks taken from the mixing tables.



Sorting, stacking and packaging

On the subsequent marshalling and sorting line the bricks are sorted and grouped ready for pack-forming. Here there is a possibility of automatic colour sorting or inspection. A pack layer gripper stacks shipping packs without pallet onto two lowering frames, inserting cardboard strips between the layers and leaving spaces in the bottom layer for the fork-lift truck. A third lowering frame is provided for stacking half-height packs.

The finished brick packs are strapped horizontally and vertically for transport and then lined up ready for collection by a fork-lift truck. In the stockyard the shipping packs are stacked in rows five packs high and four packs wide. Merry Oaks has inventory space for more than 30 million bricks.

Technical data

Merry Oaks II: Stiff extrusion plant

Production:	Facing bricks	Personnel:	40 employees
Capacity:	500 t per day, 100 mill. units in 50 weeks	Working time:	2 shifts/day 5 days/week 50 weeks/year
Reference size:	Modular brick		

Lingl Tunnel dryer		**Lingl Tunnel kiln**	
Holding room:	5.9 m	Top firing with natural gas or oil	
Length of dryer:	85.9 m	Length of kiln:	124.2 m
Number of tracks:	1	Firing channel:	8.6/1.3 m
Cars in dryer:	16 + 1	Cars in kiln:	23
Drying time:	24.4 h	Firing temperature	1100 °C
Drying shrinkage:	2.5 %	Passage time:	33 h

Works control by Allan Bradley process computer with Lingl software

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Hans Lingl Anlagenbau und Verfahrenstechnik
GmbH & Co. KG
A.-Berblinger-Straße 6 · D-89231 Neu-Ulm
Postfach 16 29 · D-89206 Neu-Ulm
Telefon +49 (0)7 31 97 51-0 · Telefax -210
http://www.lingl.com · e-mail: lingl@lingl.com

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