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JUWÖ-Brickworks III with casing-pallet dryer





At the foot of a clay hill in the midst of the vineyards in Rheinhesse:

Industrial brick-making with innovative and environmentally-friendly technologies

In the summer of 1997, the first brickworks for modular bricks in Germany was put into operation, mainly producing plano-levelled bricks with a particularly low thermal conductivity.

The design of this plant, constructed completely by Lingl from the extruder onwards, is very simple, dryer and kiln are small thanks to the quick passage times. Due to the system employed here, the transport technology of the complete works is also simple. For drying, for example, no laths, cars and storage frameworks are needed. It is designed for a daily production of 220 tons (bulk density 0.8) and operates in very slow working cycles to achieve optimum energy recycling as well as low servicing and depreciation costs, but on the other hand around the clock on seven days a week. Each of the three shifts is run with two workers, from the extruder to packaging.

The green bricks which have been cut out of the column with the universal cutter are tilted and turned for an optimum drying process, grouped and then placed in the casing-pallets of the single-layered Lingl dryer with a transfer gripper.

This casing-pallet dryer, 44 m long and 5 m wide, and operating in single layers, is a new development and represents, according to the client, a "quantum leap" in the technology of brick-making. The whole drying system is very simple, economical and easy to service.



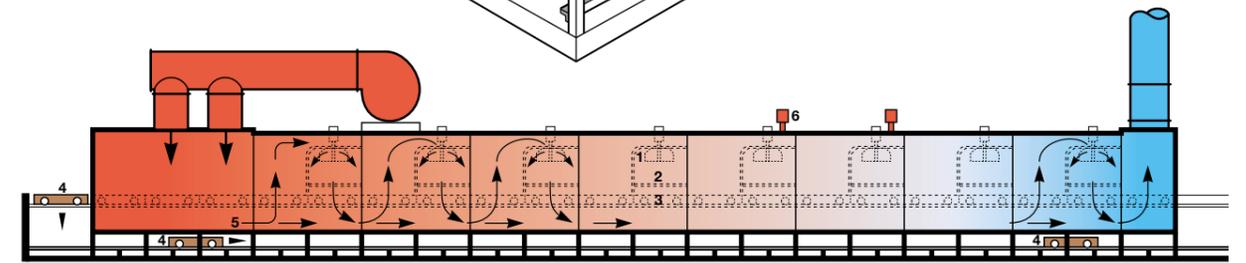
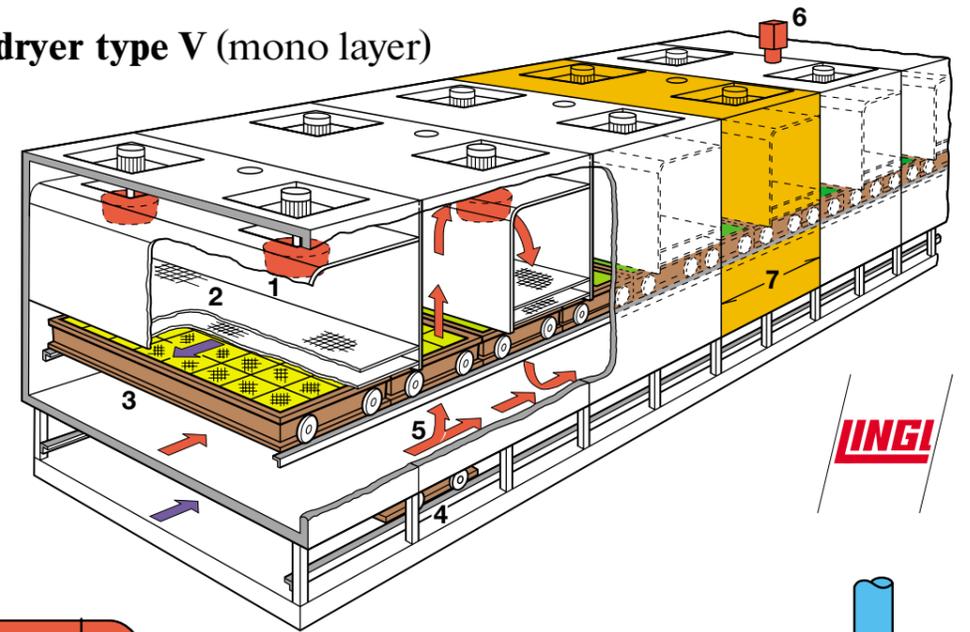


In the casing-pallets, the green bricks pass through the dryer made of pre-fabricated modules and are evenly subjected to hot air up to 200 °C, alternating from above and below, from the heat recycling system. The large surfaces of the green bricks available for heat exchange thanks to the good air flow-through makes drying possible with only a partial amount of the whole drying air and without recirculation. The air is passed in loops through the dryer in the direction of the main air flow, in each case branched off from the main air flow. This leads to a very low power consumption level for drying of only 7 kWh/t of fired material, because of the cumulative effect of the fans switched in series.



Casing-pallet dryer type V (mono layer)

- 1 FRVF free wheeling radial fan
- 2 Air build-up grid
- 3 Casing-pallet
- 4 Casing-pallet return
- 5 Drying process air
- 6 Direct heating
- 7 Dryer module

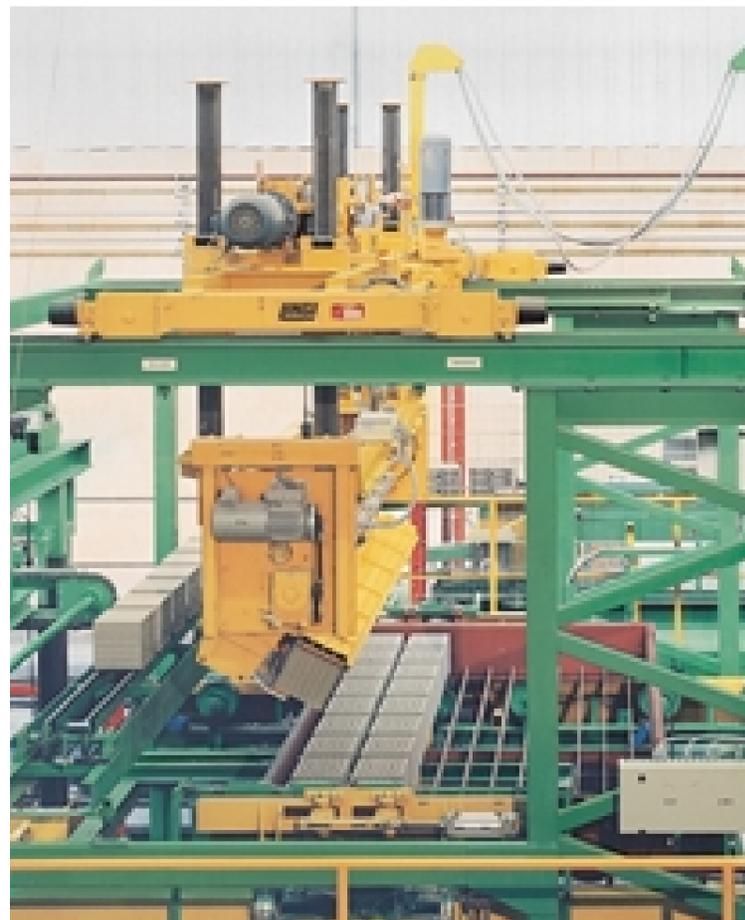




By dividing the dryer into short zones, the computer-controlled drying process can be performed very precisely.

After a passage time of less than two hours, the dried bricks leave the casing-pallet dryer.

Passing under the dryer, the casing-pallets are returned, moved into the unloading position and unloaded row by row.



The dried bricks are lifted out of the casing-pallets, in reverse to the wet side, with a walking beam. The dried bricks are tilted by 90° with a tilting gripper and placed on the conveyor leading to the plano-levelling machine, with the cut surfaces on the outside, ready for processing.

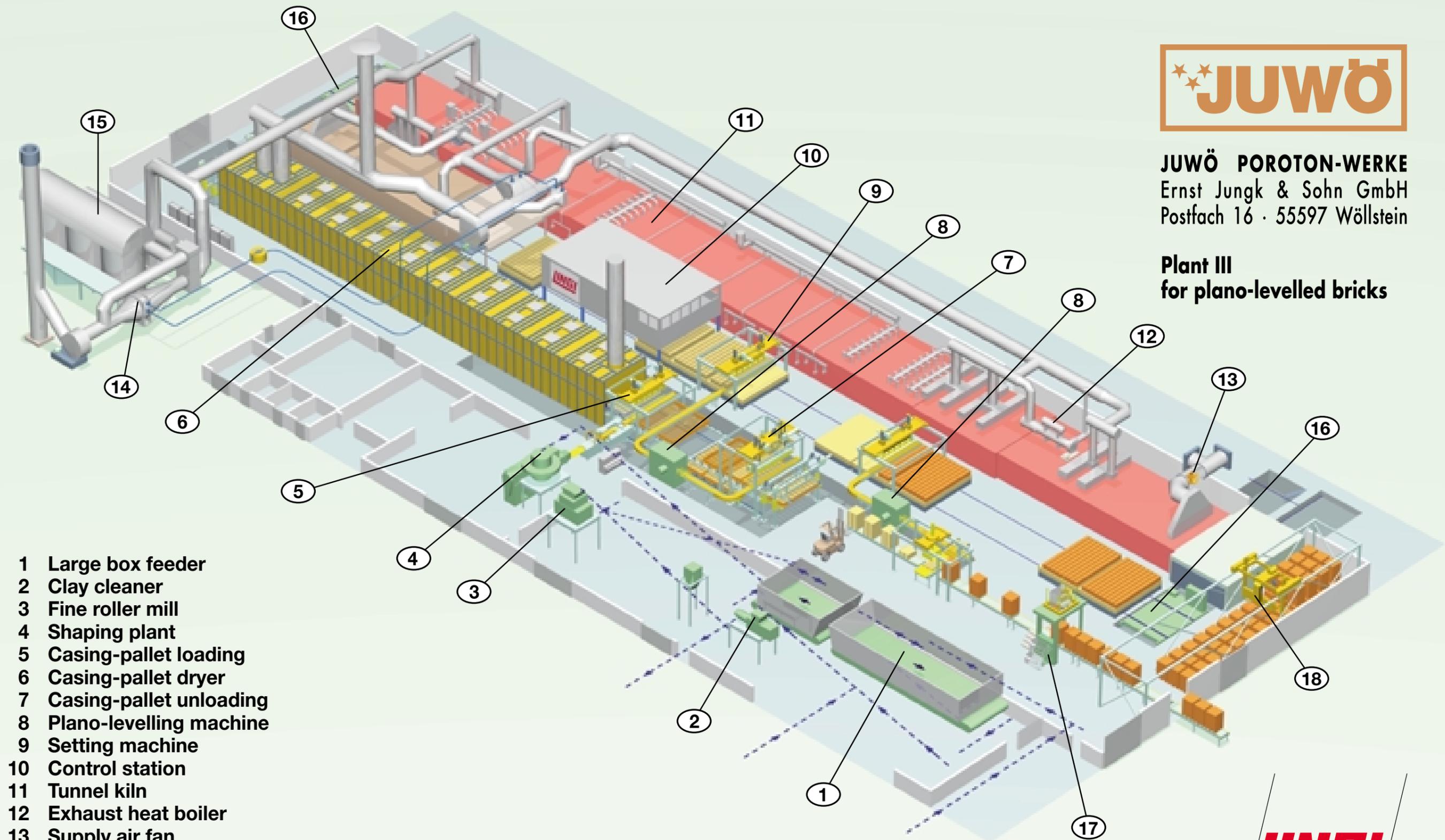
This machine grinds the bricks plane-parallel to a height of 251 mm. It is continuously checked and features an automatic grinding wheel adjustment.





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Plant III
for plano-levelled bricks



- 1 Large box feeder
- 2 Clay cleaner
- 3 Fine roller mill
- 4 Shaping plant
- 5 Casing-pallet loading
- 6 Casing-pallet dryer
- 7 Casing-pallet unloading
- 8 Plano-levelling machine
- 9 Setting machine
- 10 Control station
- 11 Tunnel kiln
- 12 Exhaust heat boiler
- 13 Supply air fan
- 14 Thermal oil heat exchanger
- 15 Exhaust air cleaning
- 16 Transfer car
- 17 Shrink hood packaging
- 18 Brick pack storage





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Precisely grouped bricks are picked up by a transfer gripper and placed accurately tooth on tooth to form turrets on the kiln car, so they can be continuously washed from all sides with the firing gases.

Prior to the tunnel kiln there is a preheater with approximately four hours preheating time. The preheater like the dryer is heated with hot air from the heat recycling system. The exhaust air from the dryer is returned to the recycling system.

Approximately every 40 minutes a kiln car is pushed, by means of a hydraulic system, into the tunnel kiln, which is heated with natural gas from the sides and above. The firing temperature is approximately 900 °C.

The turret load is 1 m high with the holes in the pull direction. Two transverse rows are set between the firing slots, so the penetration depth is very low; this way the temperature adjustment, and hence the firing quality, is substantially improved.

The kiln cars with Burton car decks are a completely new design and have a much lower mass than the familiar kind of kiln cars, although they have a hard shell, require little maintenance and have a high durability. By reducing the mass of the kiln cars alone, a fuel saving of almost 7% is reached compared with the state-of-art technology.

The energy consumption of the new plant from shaping of 27 kWh/t - without plano-levelling - is as high as that of the old JUWÖ works for drying alone.



The Lingl kiln's short passage time of only 15 hours, the combined firing from the top and the sides, a kiln body completely sealed with Teflon, as well as the sophisticated heat recycling system, reduce the heat requirements compared with the existing two plants by 100 kilocalories per kg of fired material, giving a total reduction of about 24%.

Everything is controlled from the control station. The control of all essential works components operates on a fully electronic basis, and the entire plant is run by a Lingl plant network software, so that the dryer, the kiln and the exhaust purification always guarantee highest quality.





The flue gas of the tunnel kiln is passed through very efficient thermal reactors and subsequently cooled to the lowest possible temperature with a thermal oil heat exchanger.



The major part of the heat from the pore-forming agents of the material, which used to be lost for the process, is now retrieved as a result. Under-car cooling air as well as exhaust air from the preheater is further heated for re-use with thermal oil.



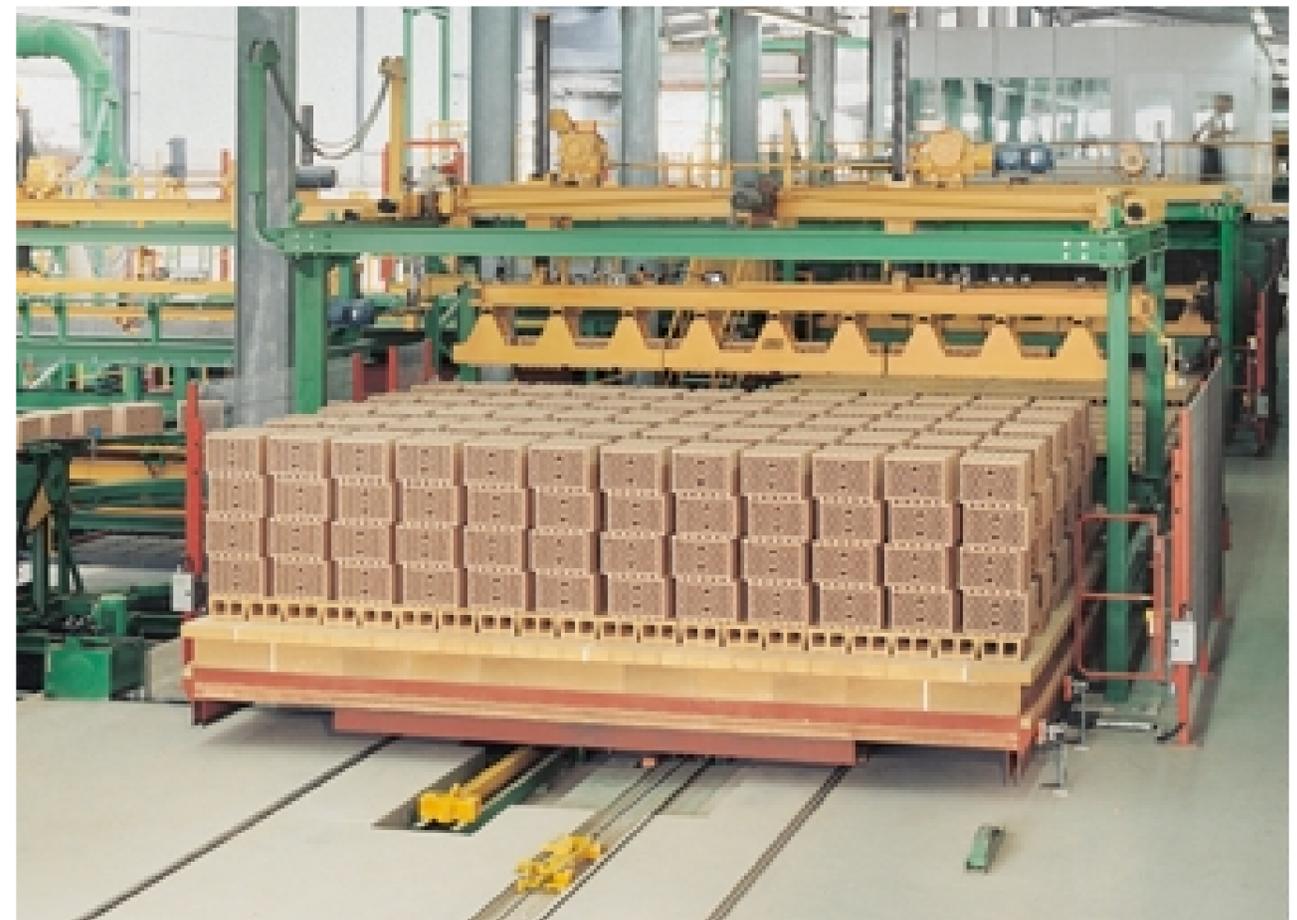
Moreover, an exhaust heat boiler is built into the upper direct suction area of the tunnel kiln and produces steam for shaping.



At the end of the 85.70 m long tunnel kiln, the kiln cars with the fired ware are taken over by the transport car in a lock and pushed into the unloading track. The new setting method is easily seen: bricks set tooth on tooth to form turrets, holes in pull direction, 4 x 2 rows the length of the cars. The result: a more even temperature distribution and shorter firing times.



In the kiln car unloading unit, the typical JUWÖ fired yellow bricks are placed by a transfer gripper onto the conveyor belt to the packaging plant. They then pass through the plano-levelling machine, where they are ground to a height of exactly 248 mm.





Brick packs suitable for transport are stacked on shipping pallets and then wrapped with shrink film hoods to ensure weather protection and safe transportation.

To avoid stacker traffic causing noise pollution during the night shift, the brick packs made ready for transport are interim-stored in the hall.

During ongoing production on the day shifts, they are restacked on the conveyor belt and brought to the final storage area by means of a forklift truck.





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Technical Data

Production:	Poroton plano-levelled bricks	Operating time:	50 weeks/year
Capacity:	220 tons/day		7 days/week
Reference size:	HLZ P 365 T (0.8)		3 shifts/day
	365/248/238 mm	Charges:	54 pcs/casing-pallet
	16.2 kg fired		384 pcs/kiln car
Staff:	2 workers/shift		60 pcs/shipping pack
	(extruder to packaging)		

Lingl casing-pallet dryer

1 system, single-layered, without recirculation

Channel length: 44 m (22 casing-pallets)

System width: 4.90 m

Casing-pallet
measurements: 200/410/38 cm

Casing-pallet
number: 33 pieces

Shrinkage: 5 %

Drying time: below 2 h

Power consumption: 7 kWh/t fired material

Lingl tunnel kiln

for vertically perforated bricks, turret setting
4 x 2 rows/car, combined top and
side-firing with natural gas

Kiln length: 85.70 m (22 cars)

Preheater: 19.50 m (5 cars)

Lock: 4.15 m (1 car)

Firing channel width: 5.40 m

Firing channel height: 1.11 m

Firing shrinkage: 1 %

Kiln passage time: 15 h

Plano-levelling machines

with automatic grinding wheel adjustment
for exact, plane-parallel grinding of the cut surfaces

Heat recycling system

Exhaust heat boiler: cooling air from the kiln produces steam for shaping

Flue gas purification: recuperative after-burning of the low temperature carbonization
and flue gases, heat recovery with ceramic reservoir material
and heat exchanger

Thermal oil heat exchanger: purified kiln exhausts heat thermal oil, with which fresh air
for the dryer is heated

Total fuel consumption (from shaping, without grinding): 27 kWh/t fired material