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# COMPLETE SYSTEM

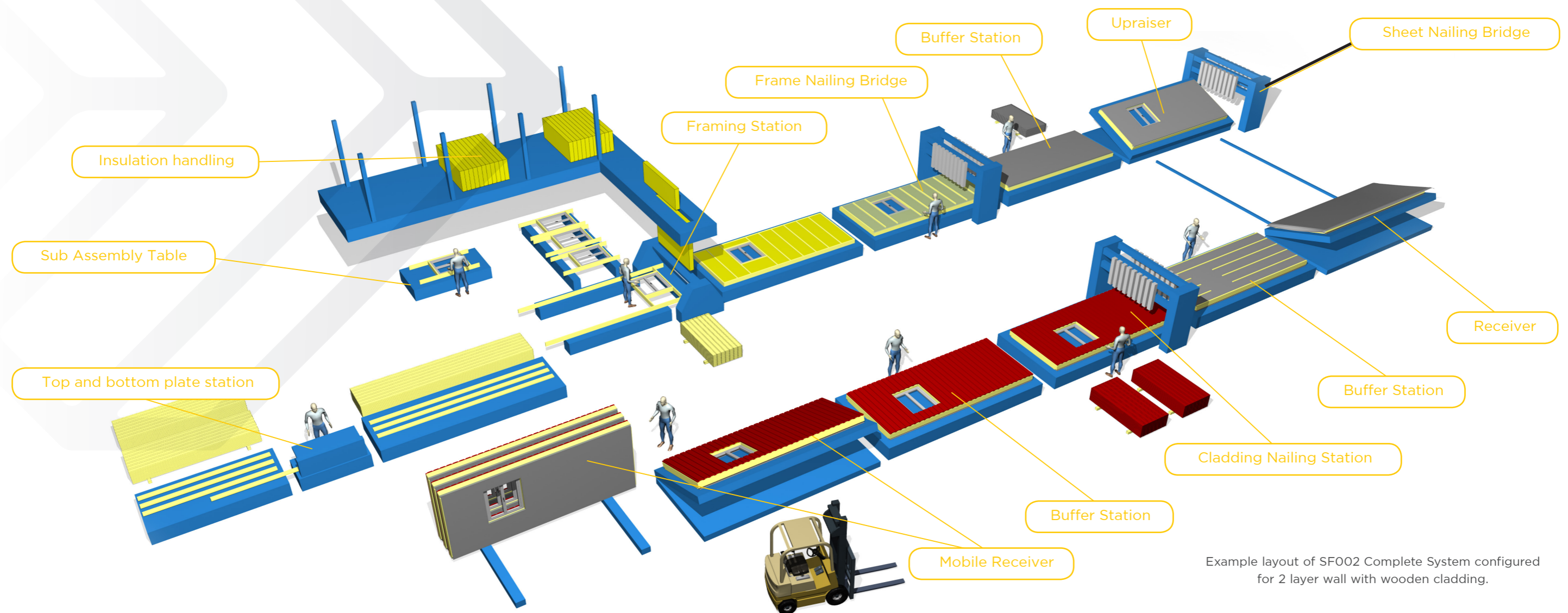
**RANDEK** 

BUILDING THE FUTURE

# SF002 COMPLETE SYSTEM IN BRIEF

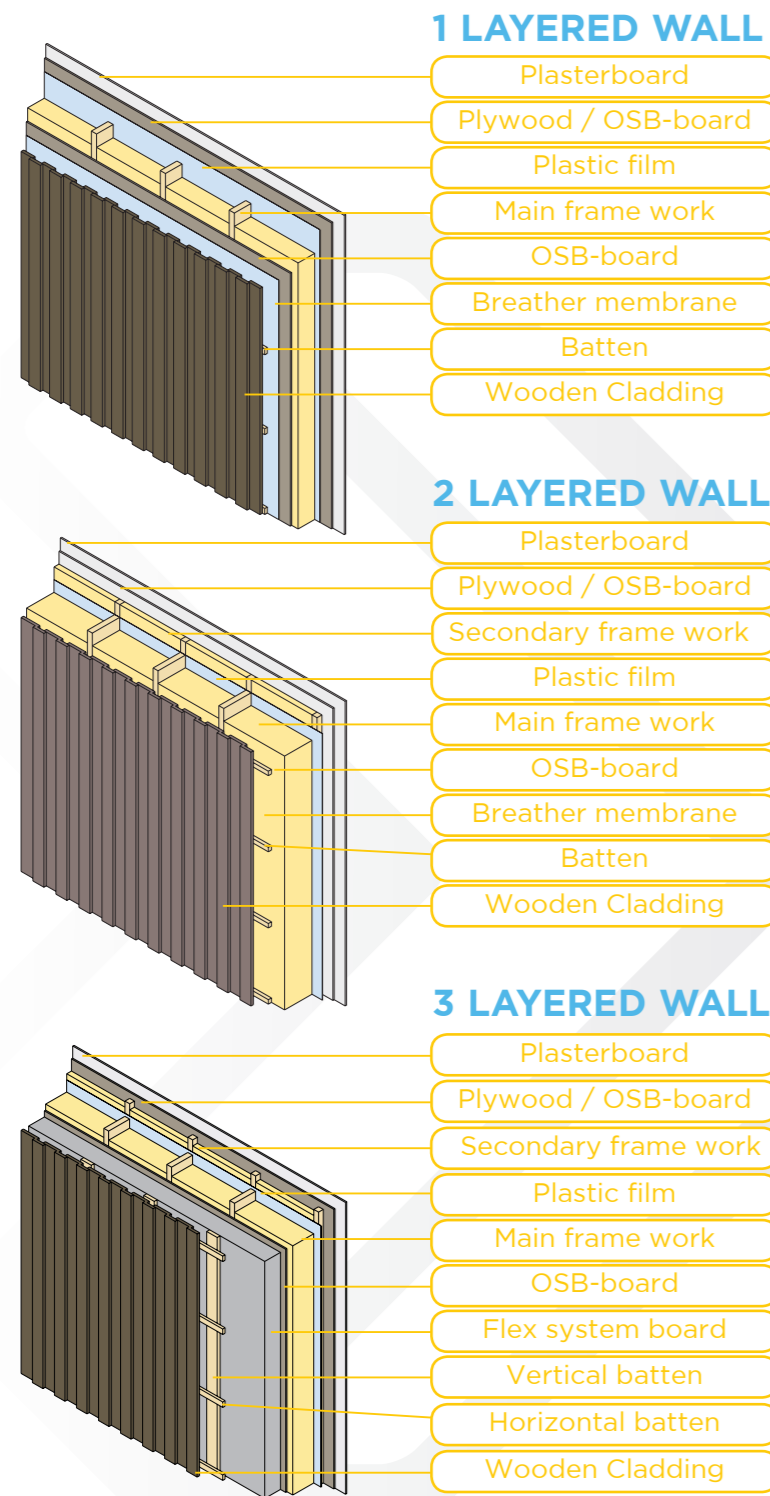
- An advanced system for production of insulated walls
- CAD/CAM-controlled
- Automatic set-up of machines, enables production of changing wall height, wall thickness and wall length without reducing the capacity due to time wasting manual set-up.
- Automatic squaring of wall element, grippers pushes the wall element against end-stops and then the wall is clamped with a motorized clamping function automatically.
- Automatic production processes, splicing of top and bottom plate, stud feeding, stud nailing, sheet/board processes: nailing, nail pushing, drilling, milling, sawing, nailing of cladding.

- Clear graphical operator instructions at each station on a computer screen.
- Automatic insulating handling system eliminates waste and handling of insulation in the production area. Automatic transport, cutting, glueing and feeding of insulation.
- High security level, safety mats between stations and light beams and run-over protection at the nailing bridges.
- Automatic transport system between stations with frequency controlled motors for high transport speed and non-damaging start and stop. Plate-top chains for possibility to reverse also very heavy wall elements.



Example layout of SF002 Complete System configured for 2 layer wall with wooden cladding.

# CONFIGURATION



- SF002 is a very flexible system and can be adjusted to fit every customer's specific conditions. The system is possible to customize according to the following parameters:
- U- or I-shaped line: The system configures as a straight line or as a U-shaped line, thus the system can fit into all types of buildings.
- Maximum wall length: 4.8, 6.0, 7.2, 8.4, 9.6, 10.8 or 12.0 meter determined of the station length.
- Wall thickness: The machines sets-up automatically to specified wall thickness making it possible to produce walls with changing thickness efficiently. E.g. it is possible to efficiently produce exterior walls mixed with inner walls making the packing order optimized for the building site without wasting time for set-up of machines.
- Wall height: The wall height is automatically set-up for most of the machines.

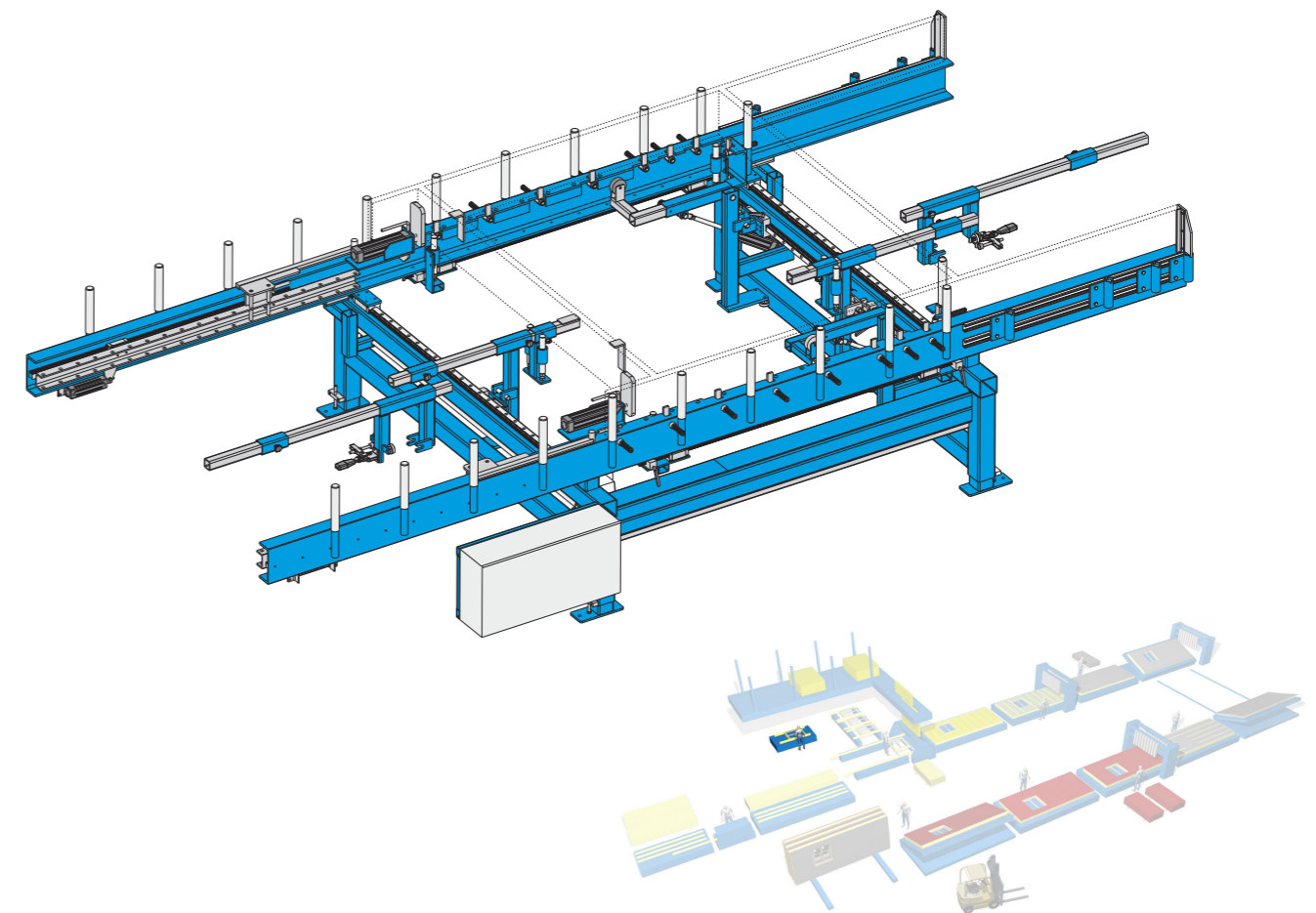
- Wall layers: The system can be configured for 1-, 2-, or 3-layer walls (see image on left hand side)
- Capacity: The system is configured according to the desired capacity. The number of stations in a line, and the degree of automation determine the capacity to be attained.
- Automation level: By adding or removing machines the level of automation is adjusted.

# SUB ASSEMBLY TABLE



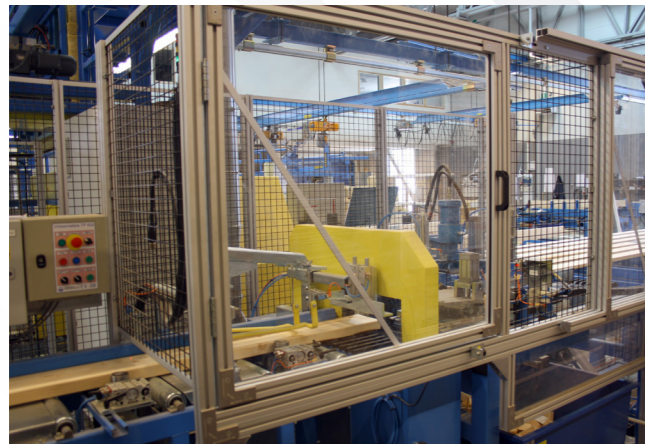
The sub component is efficiently built offline on a sub element table with motorized clamping and set-up function. The window can be opened in the station using the pneumatic arm, thus the window frame screw can be screwed efficiently. After the sub component is produced it can be placed in the production line without need for turning the element.

- Possibility to open the window using the pneumatic arm
- Motorized set-up and clamping function
- Higher capacity by offline production of sub components



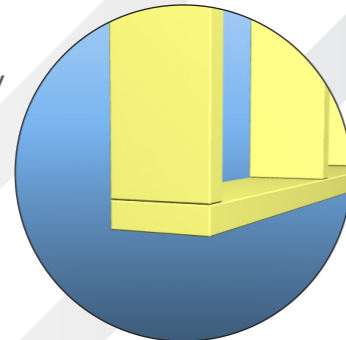
# TOP AND BOTTOM PLATE STATION

Effective production of top and bottom plate by nailing or splicing with minimal waste of wood. The top and bottom plate station has a high degree of automation and is fed with production data from the framing station using CAD/CAM.

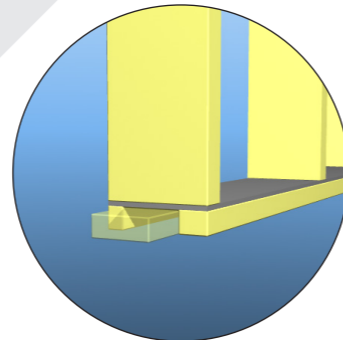


The machine splices, drills and cuts top and bottom plates with minimal waste. The nail plate is automatically placed on an appropriate position on the wall where no nailing will be done later in the production line. Finally the top and bottom plate is transported sideways to a buffer station in connection with the framing station. The station can also be equipped with vacuum picker making the production process more automated.

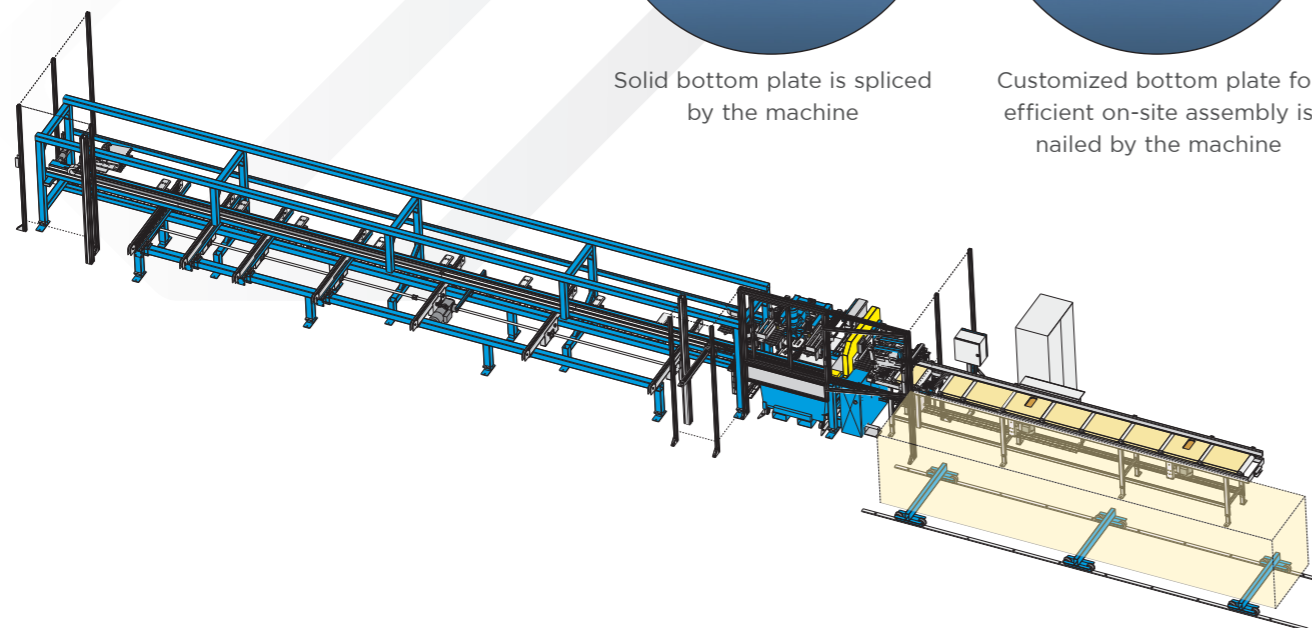
- Effective production of top and bottom plate
- The splice is placed automatically where no nailing will be performed later



Solid bottom plate is spliced by the machine



Customized bottom plate for efficient on-site assembly is nailed by the machine

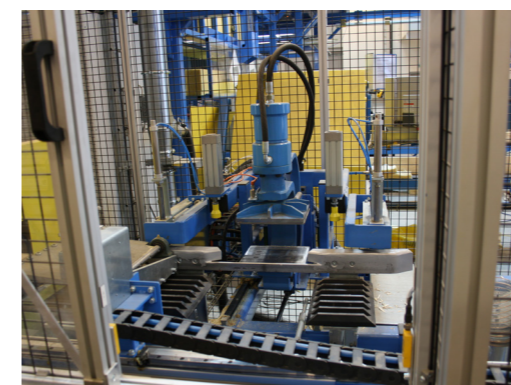


## PICKER

The timber is automatically picked by the vacuum picker layer by layer. The timber is flipped using the turning function in order to position the natural curve of the timber correctly.

## SAW UNIT

The gripping unit pulls the timber automatically to the right position. The splice and nail plate is placed where no nailing will be performed later in the production line. The saw unit cuts the timber.



## PRESS UNIT

After cutting and placing the nail plate the timber is spliced by the press unit to a ready top and bottom plate.

## BUFFER

Finally the top and bottom plate is fed to a buffer placed next to the framing station.



## CONTROL SYSTEM

The top and bottom plate is automatically produced from drawing due to the station is CAD/CAM controlled. The control system is intelligent and places the splice where no nailing will be performed later in the production line.



# INSULATION HANDLING

Complete System SF002 can be equipped with a complete fully automatic system for handling of insulation.

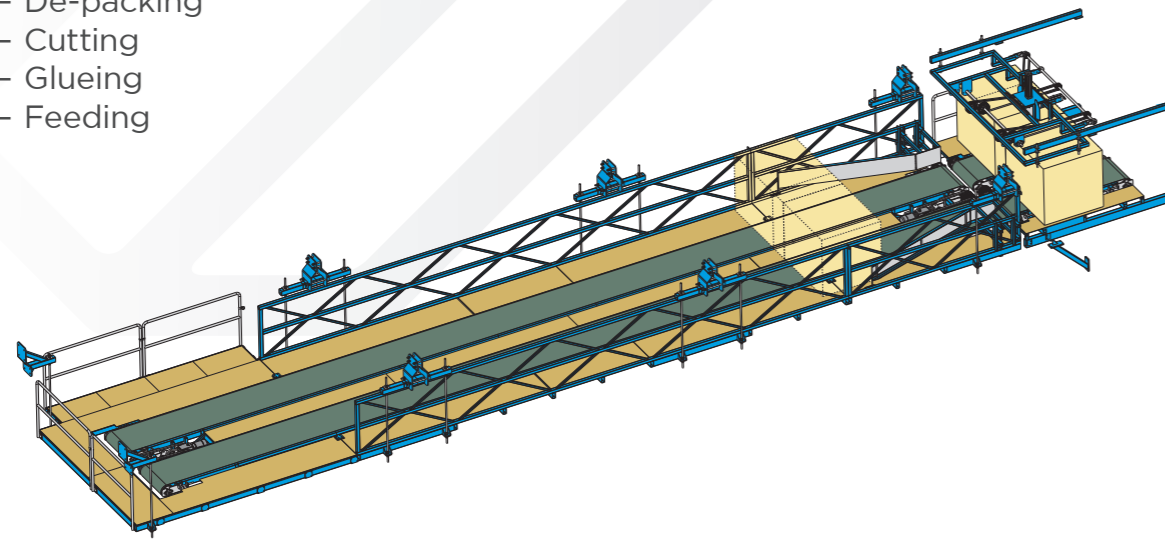


The handling of transport, de-packing, cutting, glueing and feeding of insulation is automated and the process is performed without usage of expensive production area. The entire system is installed in the roof of the factory above normal production.

The production process

First in the production process a full insulation package is lifted up on a transport conveyor that starts outside the factory, thus the forklift does not need to drive into the factory and the insulation does not need to be manually de-packed when received from the supplier. The insulation is transported on a conveyor and is automatically de-packed and glued to an endless piece. Finally the insulation is cut to the right dimension and fed directly into the framing station on the exact right time.

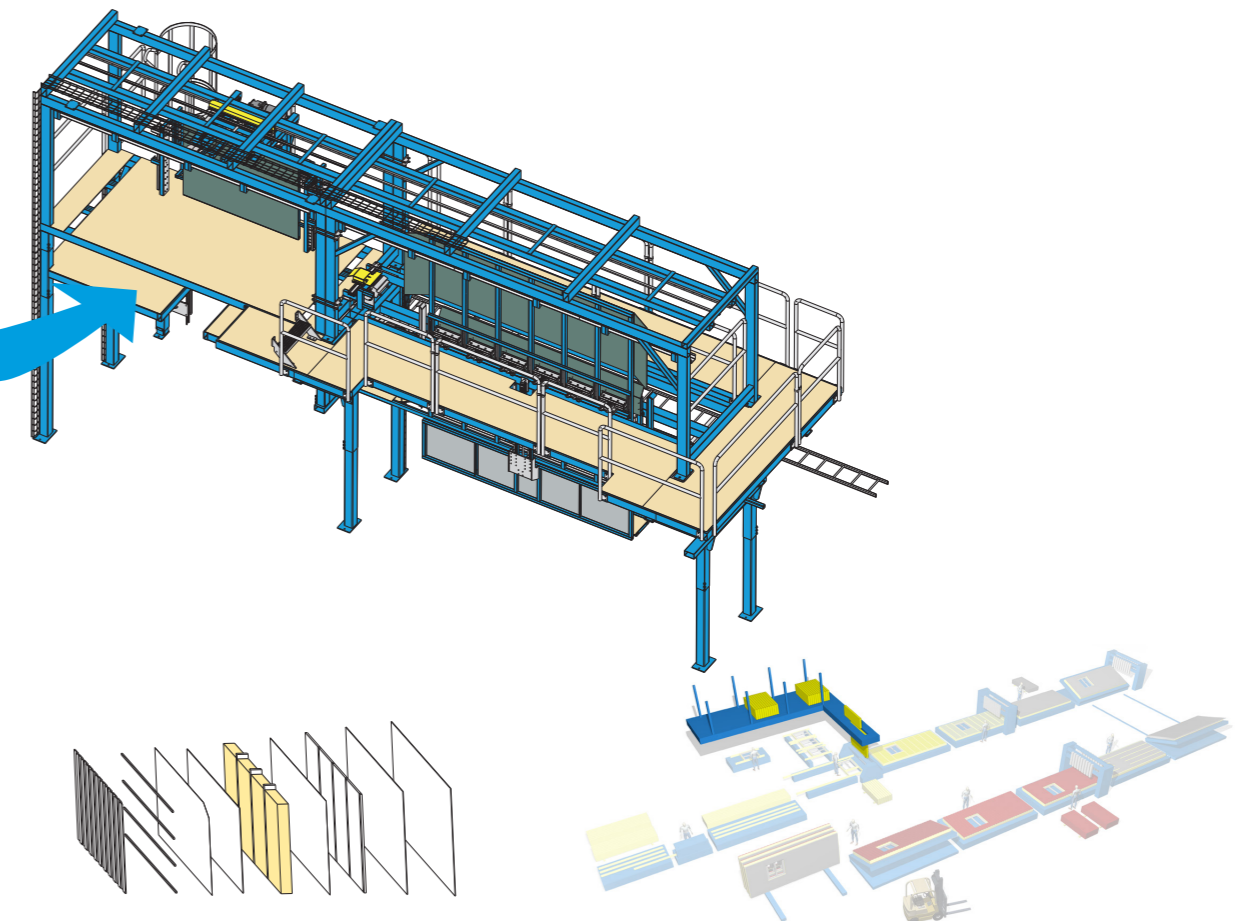
- Effective system for automatic handling of insulation
- Eliminates waste of insulation
- Eliminates handling of insulation on the production floor
- Automatic
  - Transport
  - De-packing
  - Cutting
  - Glueing
  - Feeding



View over framing station FM3000 equipped with the world's most advanced system for handling of insulation.



The insulation system can also be configured for handling of round packages of insulation.



# FRAMING STATION

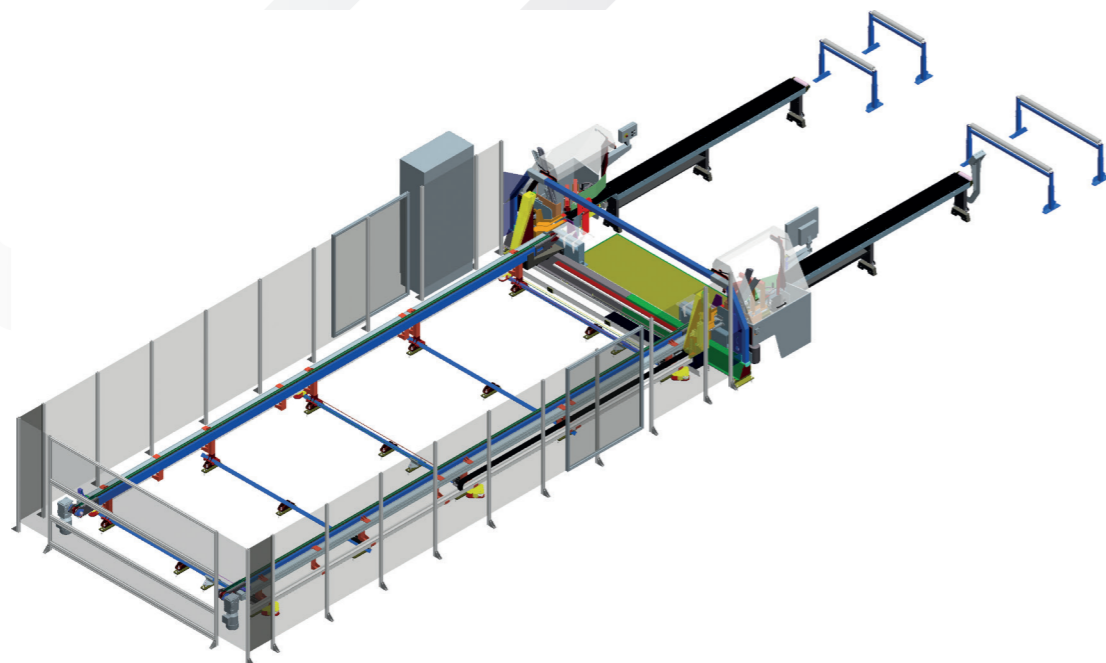
In the framing station the sub components with windows, top and bottom plate, studs and insulation is mounted together to a framework. The framework is built effectively and precise. The information is presented graphically step-by-step according to the production process on a large HMI-screen; this eliminates need of drawings in the production.



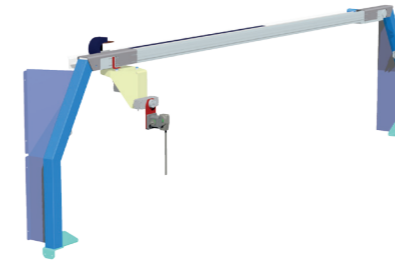
**Production process**  
The framing station is automatically set-up according to the current wall drawing using CAD/CAM data. Top and bottom plates are placed in the machine.

Grippers clamp and separate them in order to easily place studs to the framework. The studs are placed automatically if the framing station is equipped with stud feeder. Sub components with windows are lifted into the line and cut insulation is fed directly down to the operator. The framework is nailed automatically according to drawing and holes are drilled etc.

- Effective and flexible production of framework
- Automatic stud feeding



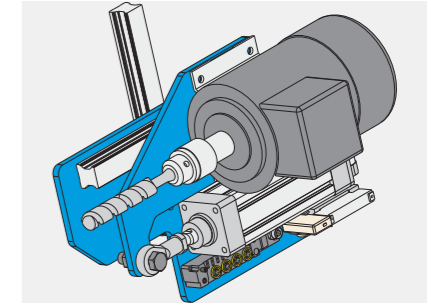
## INSULATION KNIFE



The framing station can be equipped with an insulation knife as an alternative to the advanced insulation handling station. The operator places the insulation manually in the station and then the insulation is cut to the right dimension.

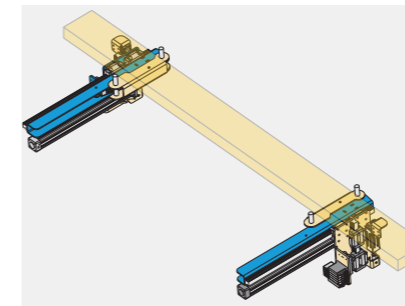
## DRILLING UNIT

Drill holes for lifting straps etc. automatically with the drilling unit.



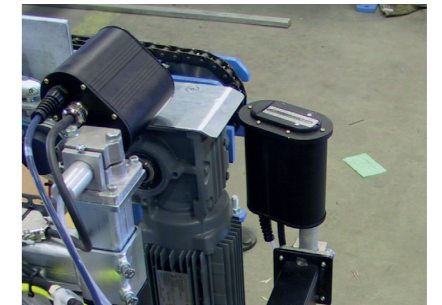
## STUD HOLDER

L-stud holder, when nailing of L-studs to the framework.



## PRINTING UNIT

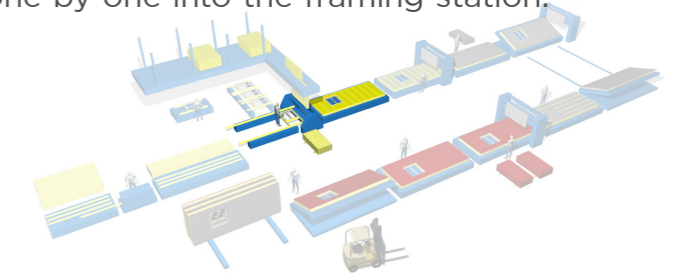
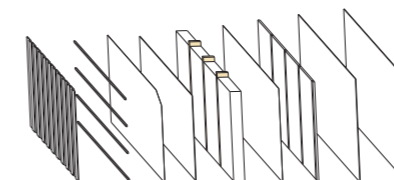
Print the order number etc. directly on the framework and achieve simplified identification and handling of walls in the factory and on the building site.



## AUTOMATIC STUD FEEDER

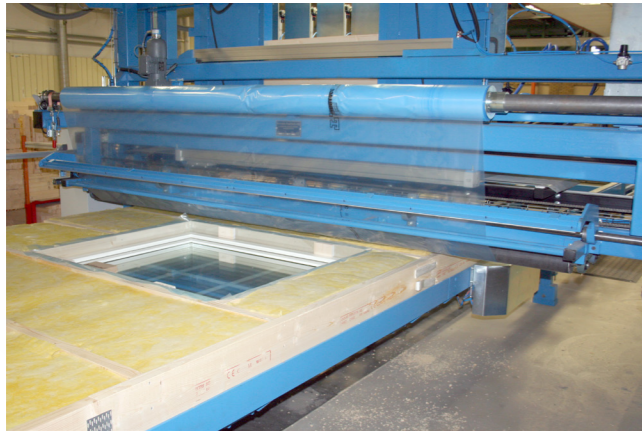


Feeding of studs can be done automatically, in order to increase the capacity or to utilize the production area better and decrease the handling of timber and material, thus improving the logistics. The automated vacuum picker picks timber layers from different stacks of timber. The right numbers of studs are fed into the machine and the remainder are returned to the right stack again. The studs are stored in the stud feeder and are fed one by one into the framing station.



# FRAME NAILING BRIDGE

Randek Frame nailing bridge automates the time consuming manual process of building the second framework on a 2 layer wall.



## Production process

The stud magazine is filled with studs and is equipped with plastic film. The machine positions and nails each stud, piece by piece, automatically on the first underlying framework according to the CAD drawing. Plastic film is also applied between the two frame works. When the entire wall is processed the plastic film is automatically

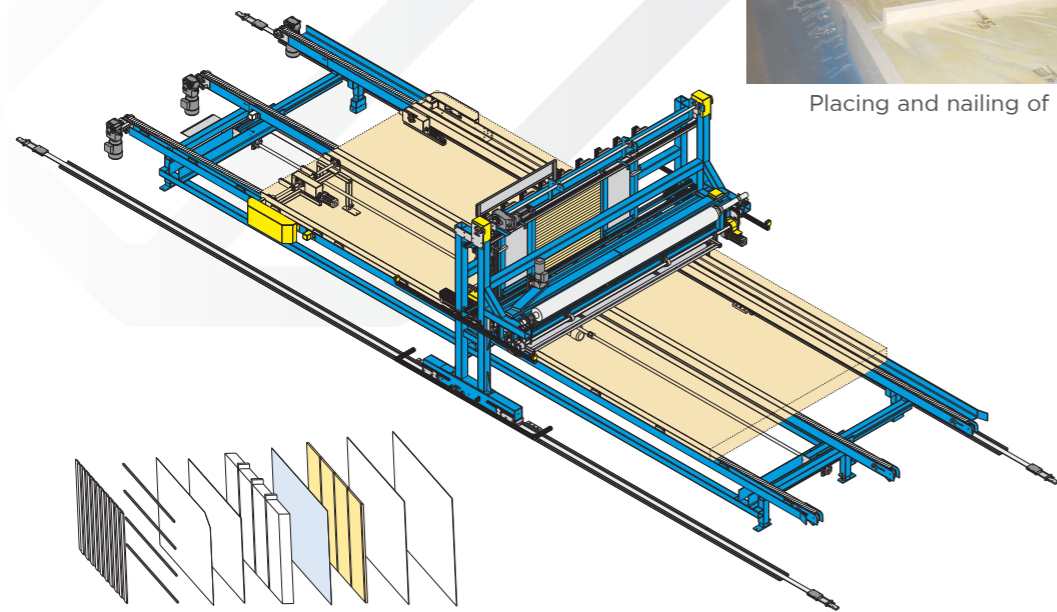
cut and the machine returns to its start position. A second framework is built automatically and exact.

After this process the framework is manually insulated and boards (OSB, plasterboard etc) applied by using lifting equipment. The boards are nailed on a few places in order to hold them in position until the next station, where the complete nailing of the boards is performed automatically by the nailing bridge.

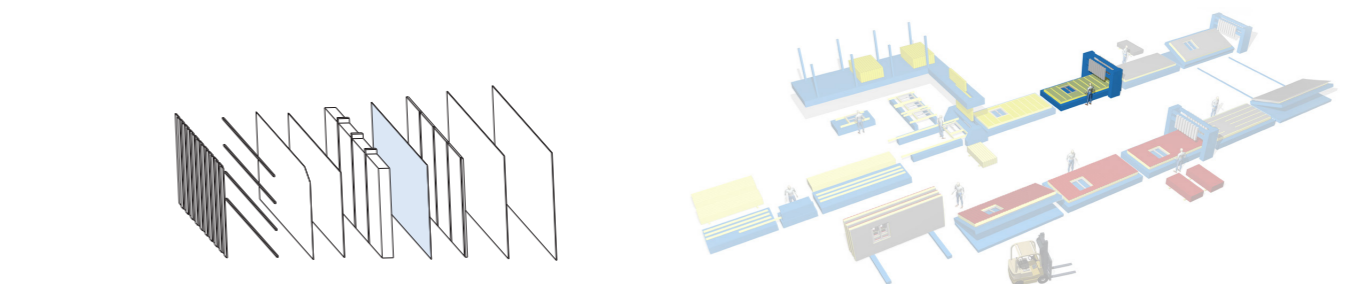
- Automatic application of plastic film
- Automatic placing and nailing of extra framework



Placing and nailing of extra framework



- Effective application of plastic film
- Easy handling of rolls of film



Application of plastic film can also be done manually. The plastic film is placed in bridge making it very easy to load and pull film from. The application can also be done automatic with the Framing Nailing Bridge or with the automatic film machine.



# SHEET NAILING BRIDGE

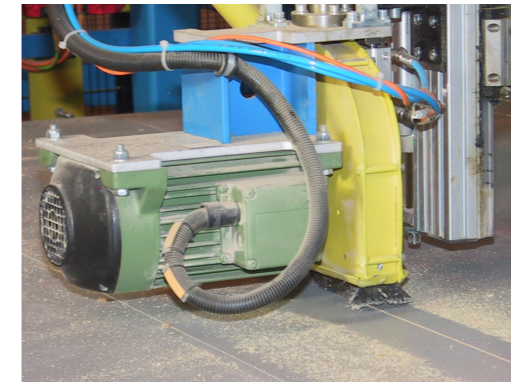
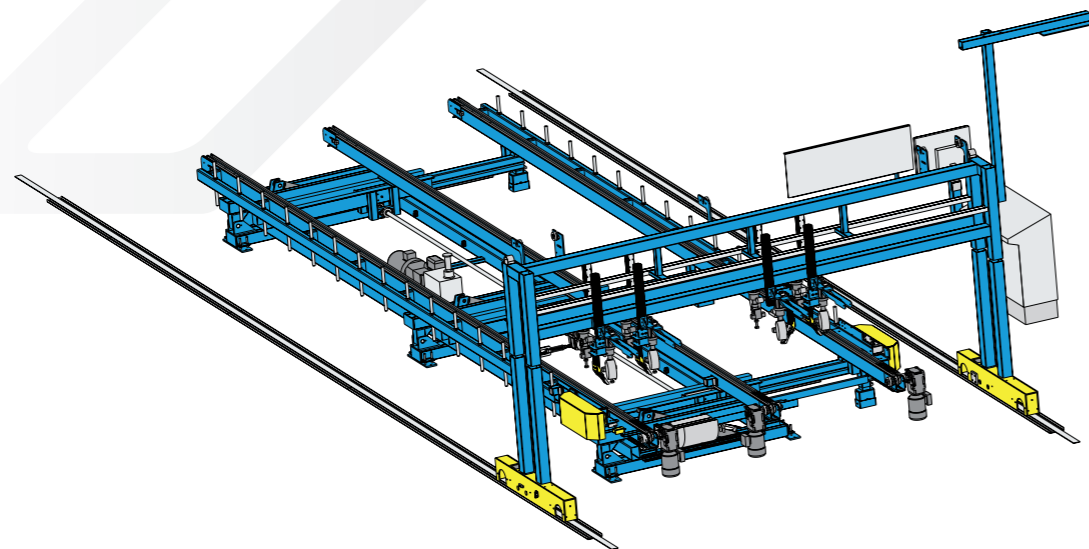


Nailing Bridge NB3000 is a fully automatic nailing bridge that can be equipped with: nailing gun, nailing pusher, screwing tool etc. The nailing bridge can also perform the following processes: milling, sawing and drilling. The nailing bridge is equipped with 4 tools in order to have a very high capacity.

## Production process

The wall is transported into the station and is squared automatically. The nailing bridge nails the sheets to the frame work. Depending on type of sheet the nailing bridge is equipped with different tools i.e when nailing plaster boards we recommend using nail pushers. The nailing bridge works according to the CAD-file and runs on rails lowered into the floor in order not to disturb the operator. The tool wagons are positioned sideways with servo motors and in height with actuators.

- Nailing of sheets automatically
- Equipped with 4 tools to ensure high capacity
- Milling unit, drilling unit, saw unit and stud aligner as option



## SAW UNIT

The saw unit can be equipped with interpolation in case of need for making angled cuts. The saw is used for sawing doors and window openings.

## DRILLING UNIT

Drilling unit for making holes for electricity or for marking the position of radiators etc.

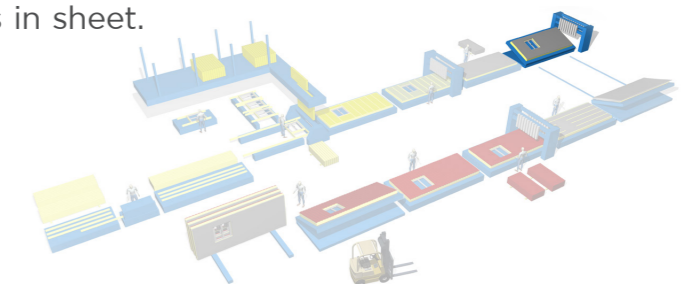
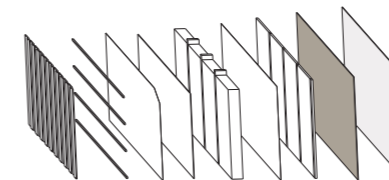


## STUD ALIGNER

The Stud aligner runs synchronized with the nailing bridge and works from below of the frame work; stud by stud is clamped and straightened. The function guarantees that the nails are nailed at the centre of each stud.

## MILLING UNIT

Milling unit with or without interpolation, the interpolation is used when milling of holes or angled shape cuts. The unit can also be equipped with edge-touch function. The mill is controlled with x- and y-coordinates from the CAD file and an edge-touch function controls that the mill does not run into a stud or misses parts of a sheet. This increases the quality of the process and enables placing of the joint at any position i.e. above windows which decreases risk of cracks in sheet.

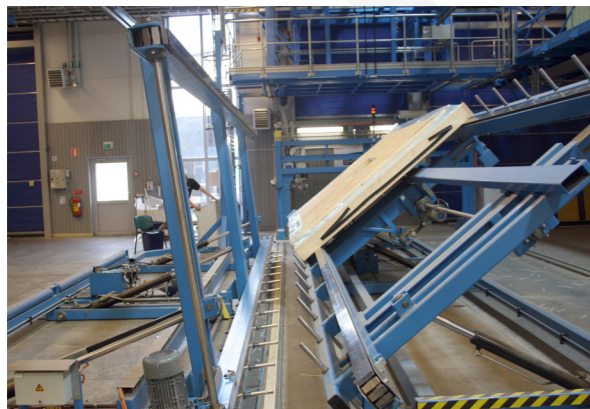




# TURNING STATION

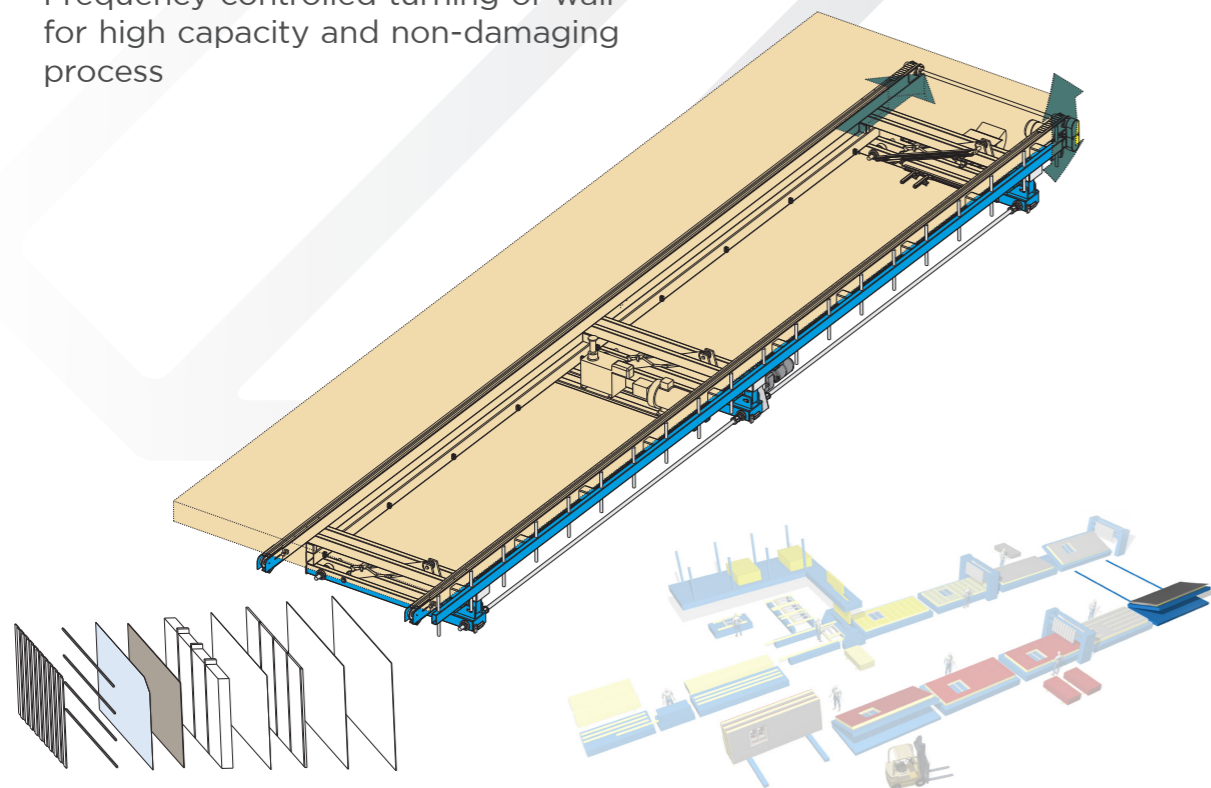


The turning takes place in two stations. The previous station shall therefore be equipped with a upraise function. When the wall is processed the receiver table travels sideways to the upraise table. Both tables are raised and the wall is turned over during a controlled, automatic and safe process. The wall is received by the receiver table and is lowered to horizontal position. Finally the receiver table travels sideways back to start position.



Breather membrane is placed in the bridge and is manually nailed or by an automatic film machine. Then manual processes are performed such as electrical installations, additional insulation etc.

- Safe and controlled turning of the wall element
- Frequency controlled turning of wall for high capacity and non-damaging process

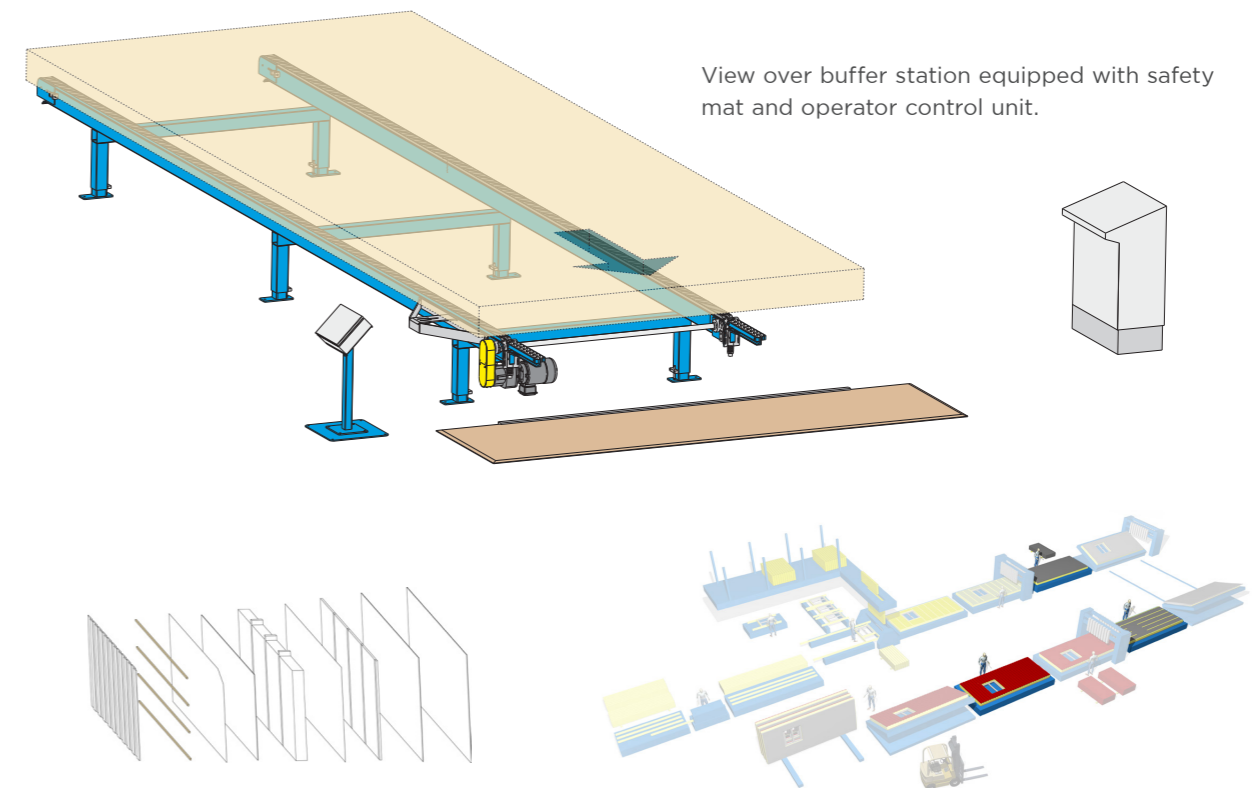


# BUFFER STATION



The wall is automatically transported into the buffer station. In this station the battens are fastened on which the wooden cladding shall be nailed to. The transport speed is frequency controlled, enabling non-damaging start and stop with high transport speed. The station is equipped with safety mats, eliminating risk for operators to get pinched between station and moving wall element.

- Equipped with safety mat for high security
- Frequency controlled chain conveyors for high transport speed and non-damaging start and stop



# NAILING TABLE WITH NAILING BRIDGE FOR CLADDING

Nailing Bridge NBC3000 rationalizes and automates nail pushing of wooden cladding. The machine consists of a bridge equipped with 4 tool wagons each holding 2 tools, in total 8 nail pushing tools. The nails are pushed down to exact right depth making the final result perfect compared to nailing of traditional nailing tools. The bridge is also equipped with a batten straightener. The underlying machine is equipped with cladding template flexible in x-, y- and z-direction. The machine is CAD/CAM controlled, thus each processed wall element can be customized.

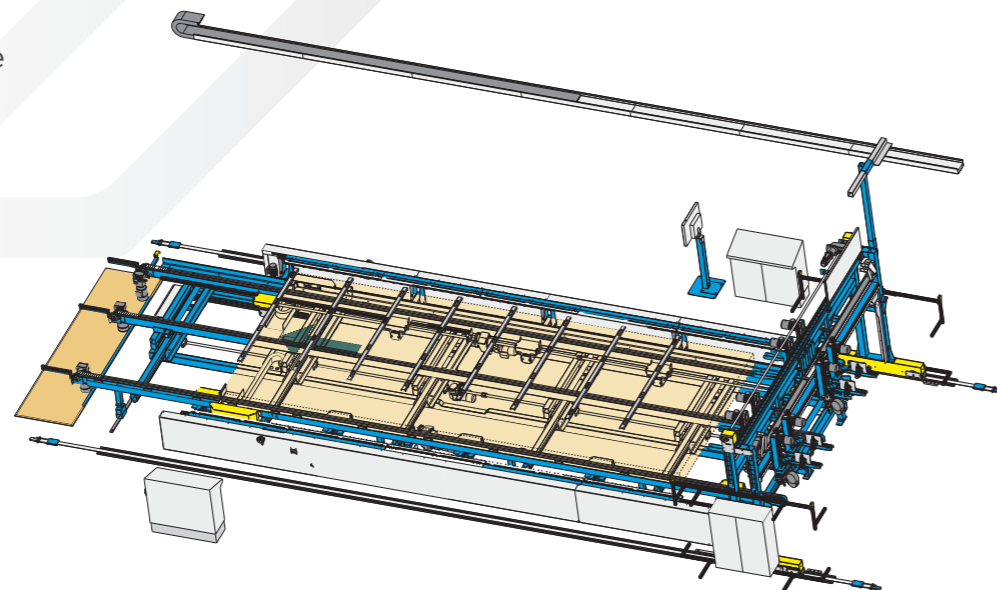


## The production process

The wall is transported into the station and is squared automatically. The timber is placed in the cladding template easily and effectively, the templates can be replaced easily. The following parameters are adjustable in the nailing table: start position for the cladding, overhand or indentation and thickness of wall. Thus the station is adjustable in x-, y-, and z-direction making it very flexible. The cladding template holds the cladding in

position and fixates it during the automatic nail pushing process.

- Precise and efficient nail pushing process
- High capacity
- Flexible machine



The nailing bridge initiates an automatic production process; the nails are pushed into exact depth in the wooden cladding. When nailing some type of cladding the batten straightener holds the cladding in position during the nail pushing process making the quality of wall very high. The tool wagons are positioned sideways by an actuator and in height using servomotor. The pushing tools are desynchronized by a fraction of a second in order not to destroy the wall element with extreme pushing force at once. This way a high capacity is achieved and the frame work will not get damaged.



Nailing Table NTC3000 equipped with cladding template adjustable in x-, y-, and z-direction. The templates can easily be replaced.



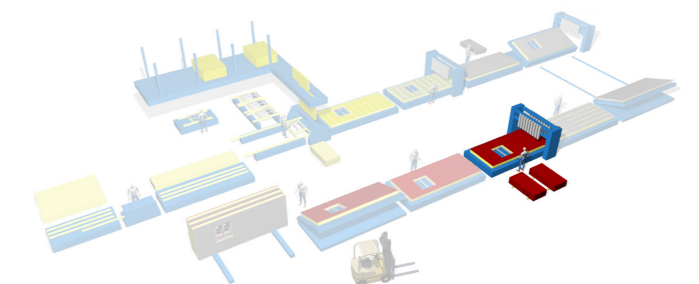
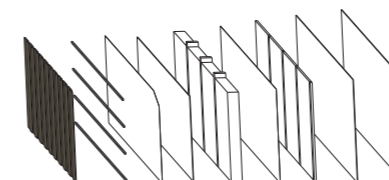
The nailing bridge is equipped with 8 nail pushers reaching a high capacity and batten straightener for positioning of the cladding.



The cladding template makes the placing of timber exact and the nail pushers push the nails to exact depth unlike when nailing with traditional nailing guns.



The nail pushers are desynchronized by a fraction of a second in order to not damage the frame work and to still maintain a high capacity.

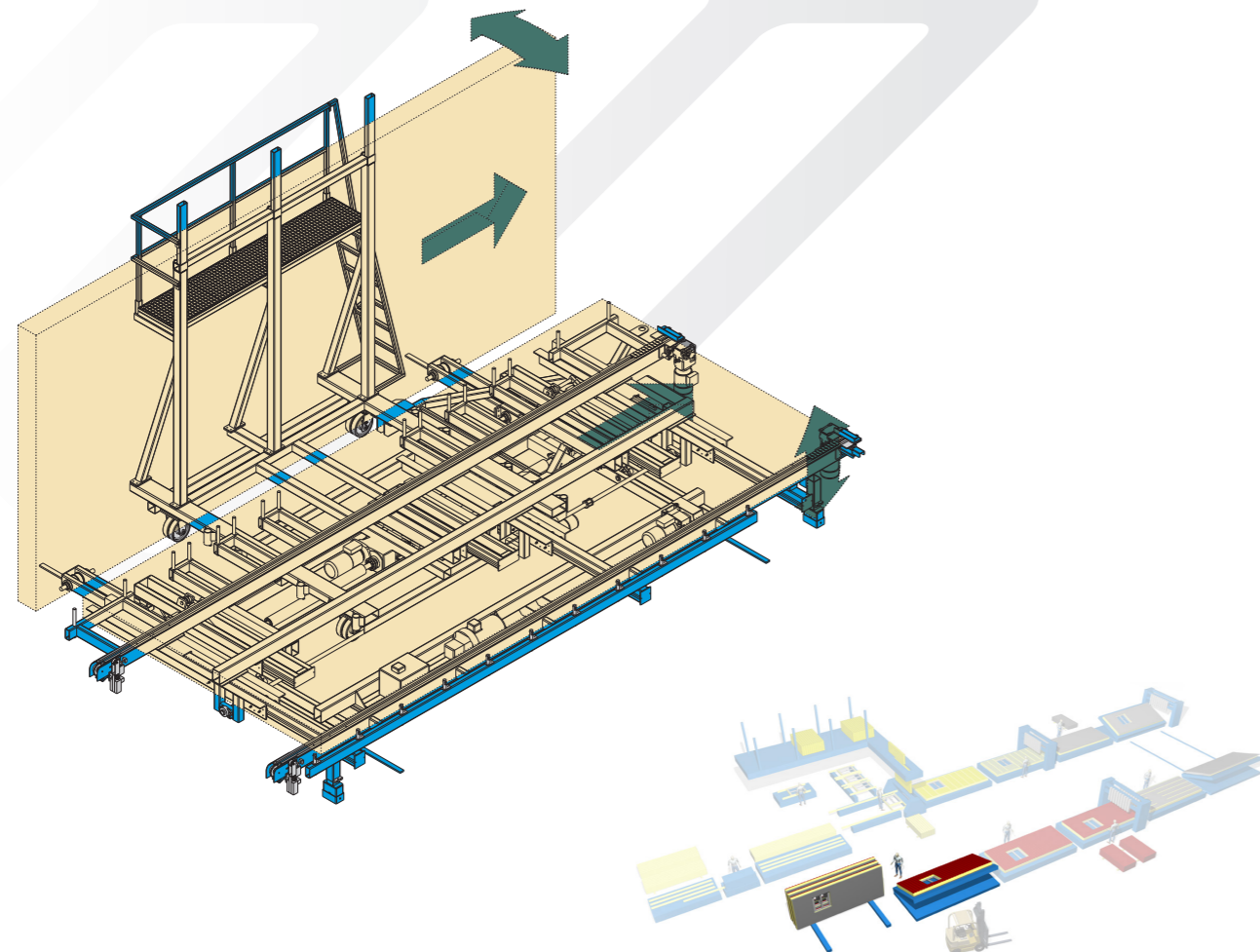


# MOBILE WALL STACKER



The wall element is transported automatically into the station. Manually installations are performed on the wall element. The wall element is raised and stacked automatically on a wall wagon. The wall package is bundled, packaged and is finally placed on a truck for transport to building site.

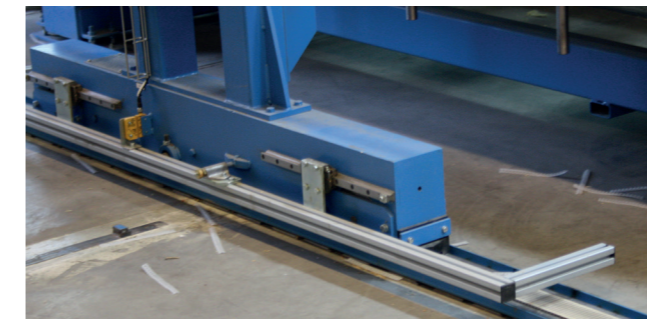
- Automatic and safe stacking of wall elements
- The walls are bundled to a package and placed on a wagon



# SAFETY

Randek complete system has a high security level and is CE-marked according to the present machine regulations. The machines are equipped with security equipment according to the specific condition for each machine. The situation in the factory is also taken into consideration. The walls act as natural barriers and open areas shall be protected by safety nets or other safety equipment.

- Between all stations there are safety mats placed for eliminating the risk for operators to get pinched between the station and a moving wall element.
- Machines i.e Nailing Bridge NB3000 and NBC3000 requires extra safety and are therefore equipped with light beams that can stop the machine if necessary.
- Run-over protection stops the machine in case of collision between operator and machine.
- Machines that require encapsulation and where no access of operator is necessary are surrounded by safety nets.
- Indicator lights on the machine if any safety feature is activated to clarify.
- All safety processes are logged in the machine.



Run-over protection eliminates risk for personal damage when the nailing bridge is moving.



Safety mats between the stations eliminates the operators to get pinched between the station and a moving wall element.



Light beams ensures that only the wall element is transported into the machine.



Light beams and safety mats between the stations.

# CONTROL SYSTEM



Randek machines in the Complete System have a high degree of automation with intelligent machines that are controlled by generated data from a CAD-system. The operator does not need to program or instruct the machines to do operations each machine analyses the CAD generated data and performs the operations automatically.

Each machine is equipped with an industrial computer connected to a network. On each computer a windows OS is installed together with a PLC-control system and an operator interface. Because the machines in the 3000-series production line are connected to an Ethernet network each machine can be accessed individually. Randek has the possibility to connect for remote support through secure VPN-connection. The control system for the machines is a soft-PLC system, thus both the operators interface and control system be accessed, locally or remotely, making it possible to review the status of the machines during live production.

- The machines are controlled by CAD-generated data. The operator does not need to program the machines.
- Modularly designed machine with optional equipment.
- Individual machines with own intelligence. Communication with adjacent machines is done with a standardized interface.
- Automatic set-up of machines for each building component and automatic transport of building component station to station.
- Minimal need for technical drawings. The digital identity of the building component follows the physical transport from station to station; each station can present the required information, drawing, operator instructions etc.
- Monitor on each station with step by step instructions and graphic display of the building component. On the stations that require operator instructions, the operator is informed what to do next and the actual detail of the building component is graphically highlighted in red.
- Alarm management on each station with presentation on monitor for actual event alarm.
- Light towers on each machine for showing status of alarm and operation of machine.
- Remote support with individual connection to each machine.
- High degree of personal safety with safety mats, light beam and collision protection.

# TECHNICAL DESCRIPTION

All stations for wall production in the Randek range can be customized for different maximum wall lengths. The length steps are: 4,8m, 6,0m, 7,2m, 8,4m, 9,6m, 10,8m and 12 meters. In the production line chain conveyors are used as



transport method. The chain conveyors ensure an effective and non-damaging transport of the walls. The chains are of highest quality “plate-top” chains making it possible to forward and reversible transport of very heavy wall elements. The chain conveyors are frequency controlled for non-damaging start and stop and for high transport speed.

Complete System is scalable and can be configured according to your requirements, therefore the air and power consumption varies for each production line. Below we have specified the technical information general for Complete System.

Technical description	Min	Max
<b>Wall dimensions</b>		
Wall length	1200 mm	4800 mm - 12000 mm
Wall height	2100 mm	3300 mm
Wall thickness (Main framework. Total wall thickness by demand)	63 mm	250 mm
<b>Production line (with stations for Max wall length of 8,4 meters and U-shaped layout)</b>		
Length	60 meters	
Width	36 meters	
Area	2100 m <sup>2</sup>	
<b>Machines</b>	<b>Electrical consumption</b>	<b>Air consumption</b>
Top and bottom plate station	3x400 VAC 35A+N+PE, 50 Hz	7 bar 1"
Sub Assembly Table	3x400 VAC 16A+N+PE, 50 Hz	7 bar 1/2"
Insulation handling	3x400 VAC 50A+N+PE, 50 Hz	7 bar 1"
Framing Station	3x400 VAC 35A+N+PE, 50 Hz	7 bar 1"
Stud Nailing Bridge	3x400 VAC 25A+N+PE, 50 Hz	7 bar 1"
Buffer Station	3x400 VAC 25A+N+PE, 50 Hz	7 bar 1/2"
Upraiser	3x400 VAC 50A+N+PE, 50 Hz	7 bar 1"
Sheet Nailing Bridge	3x400 VAC 50A+N+PE, 50 Hz	7 bar 1"
Receiver	Electrical supply from the Upraiser	
Cladding Nailing Station	3x400 VAC 25A+N+PE, 50 Hz	7 bar 1/2"
Nailing Bridge	3x400 VAC 63A+N+PE, 50 Hz	7 bar 1"
Movable Receiver	3x400 VAC 35A+N+PE, 50 Hz	7 bar 1/2"

# RANDEK IN BRIEF

Randek develops, manufactures and markets high-performance machines and systems for prefabricated house manufacturing. The product range consist of: cut saws, wall-, floor- and roof lines, roof truss system, butterfly tables and special machines. The automation level stretches from fully automated to manual.

The company history goes back to the 1940s and began working in close cooperation with the first prefabricating house producers. Today leading house producers in 38 countries are using Randek machines and system.

## CUT SAWS

High quality and well tested saws with different automation levels. Also specialized saws for custom applications.



## WALL-, ROOF- AND FLOOR LINES

Complete product program for manufacturing of walls, floors and roofs. From manual to fully automatic systems.



## ROOF TRUSS SYSTEMS

Adapted equipment for rational manufacturing of roof trusses. From traditional systems to fully automatic.



## BUTTERFLY TABLES

Flexible and well tested butterfly tables. Simple or advanced with a wide range of options.



## SPECIALIZED MACHINERY

Customized machinery developed for specific applications, Automatic stucco machine, Beam insulating machine, Roof board machine and Window frame machine.



## SERVICES

A wide range of services such as Factory Layout designs, Machine maintenance, House building systems and Financing.

