BUILDING THE FUTURE

AutoWall system

We have the pleasure of submitting our offer according to agreement. We are happy to answer any questions related to this offer whenever needed.

Appendix

1	P2628 Layout rev 2.11-L4536
2	Concrete R-000210(C)

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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.

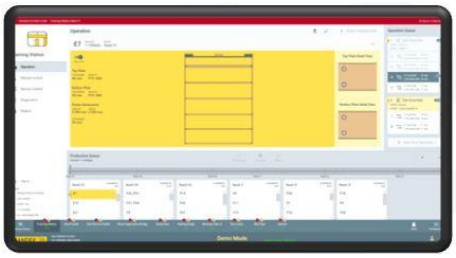
The company history goes back to the 1940s and began working in close cooperation with the first prefabricating house producers. Today, leading house producers in over 40 countries are using Randek machines and systems.

Overall material dimension limitations.

Wall height:	Max. 3300mm Min. 2100mm
Wall length:	Max. 6000mm Min. 1200mm
Wall thickness:	Max. 245 mm Min. 63 mm
Top and bottom plate:	Max. 245 mm Min. 63 mm
Noggin	Max. 90x45mm Min. 70x38 mm
Studs:	Width: 38 – 45 mm Height: 63 – 245 mm Length: 2100-(2xW)mm – 3300-(2xW)
Sheets:*	OSB and Plasterboard Thickness: 9 – 12 mm. (0,35'' – 0,47''). Weight: < 70kg. Size: Max. 3300x1200 mm, Min. 2100x450 mm. Fastening method: Nailing, stapling or screw (applies to all layers and sheet types specified).
Wall-element weight:	Max. 750kg

The limitations above apply for an entire machine line.

P1. Framing Station 3000



Framing station FM3000 for manufacturing of prefabricated timber framework. The machine is flexible, and a number of options can be added. The machine requires CAD/CAM-connection. Visualization of the element on the HMI screen makes it easy to follow the building process.

Function description

- Choose the framework to manufacture on the HMI-screen.
- Place top and bottom plate and fixate them with pneumatic cylinders after acceptance from operator.
- The stud is automatically fed into the station from the stud feeder, or it is placed manually if no stud feeder is present.
- Pneumatic vertical fixation of the stud and fixation against stud stop.
- Automatic nailing of stud.
- The patented gripers feed the framework forward to the next nail position.
- Drill holes automatically in top plate for lifting straps or wiring etc. Requires option FM3-DUX.
- Manually place the sub-component into nailing position in the framing station. Automatically nail sub-component to the framework after operator confirmation.
- The production process is repeated until the wall element is finished and the wall element is fed to the next station in the production line.

Technical description	
Transport speed	1 m/s
HMI	1 industrial touch screen 19"
Personal safety	All equipment is CE-marked and designed according to Machinery Directive 2006/42/EEC.
Connections	Air consumption: ~1100NL/min @ 8 Bar (1" connection). Exhaust connection: 400m^3/h @-10Kpa.
Stud height	63-245mm
Thickness studs	35-45mm
Height bottom plate	63-245mm
Thickness bottom plate	35-45mm
Height top plate	63-245mm
Thickness top plate	35-45mm
Width sub-element	0-3000mm
Width, wall element	2100-3300mm
Transport capacity, weight	540 kg
Fixed side	Left

NOTE! Nailing gun is not included. Brand and model are determined together with Randek AB.

General guidelines for tools:

- Designed for fitment in a machine and of industrial grade.
- Equipped with an (empty) magazine sensor.
- Must be equipped with sensors for firing (firing and empty chamber) alt.
- Must be available as CAD model .STP or equivalent format.
- Quick connections (electric and pneumatic) to the tool for changeover.
- M16 screw for attachment.

FM3-DU[X] - Drilling Unit

Drilling unit for drilling holes in the bottom or top plate. The holes can be used for preparation for example: pipes, cables or electrical installations to be installed at the construction site or final assembly. Available in 2 options: FM3-DUM mounted on movable side (top plate), and FM3-DUF mounted on fixed side (bottom plate).

Function description

- Equipped with housing and outlet for connection to an external dust collection unit (dust collection system is not included).
- Holes are drilled in the standing side of the top plate.
- Drilling unit for drilling holes in the bottom plate (FM3-DUM).

Technical description	
Function	Automatic according to CDT-file.
Size drill bit	Ø25-38 mm
Size drill chuck	Ø1-16mm
Pre-installed drill	Ø25mm

*Manually adjustable in height (Z-direction).

SI - Stud Infeeder

Stud Infeeder is a machine that feeds the stud from the automatic stud feeder to the stud elevator in the framing station.

Function description

- CAD/CAM-controlled.
- Stud is automatically fed into the framing station.

FM3-SE - Stud Elevator

Automatic placement of studs between top and bottom plates.

Function description

- Transport shuttle from fixed side with feeder.
- CAD/CAM-controlled.
- Automatic placement.
- Stud is raised and positioned.

FM3-SER Sub-Element Rollers

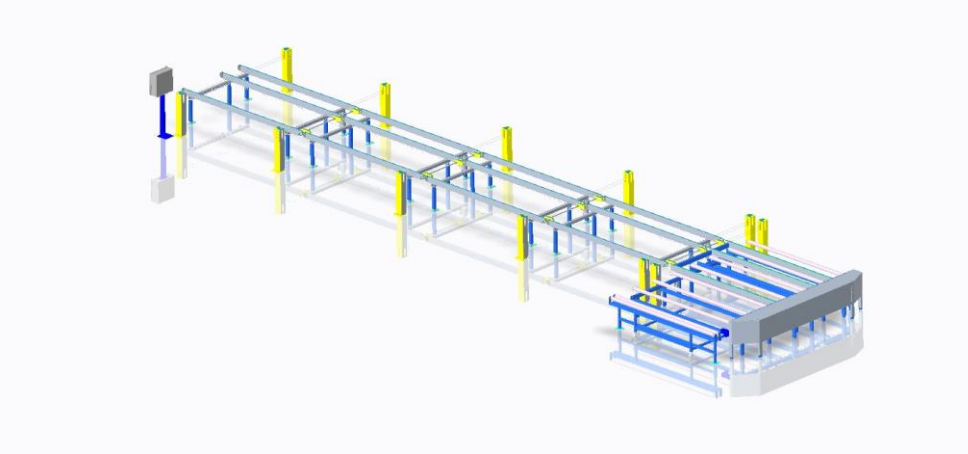
3 height-adjustable feed rollers for easier handling of sub-elements. The rollers are raised and lowered via the push of a button.

FM3-AH - Auto holders
The holders that clamp the top- and bottom plate to studs before nailing process is automated according to CDT file. The holders automatically adjust thickness to fit the next wall element.

FM3-NogRobA - Adapted for Noggin Robot
Support unit for noggin when using robotic noggin system

Art. No.	Description	Qty.
FM3000-060	Framing Machine 6m	1
FM3-DUM	Drilling Unit Movable	1
FM3-SER	Sub-Element Rollers	1
FM3-AH	FM3 Auto holders	1
FM3-NogRobA	Adapted for Noggin Robot	1
FM3-SE	Stud Elevator	1
FM3-SI	Stud Infeeder	1

P2. Sub-Element Buffer Conveyor

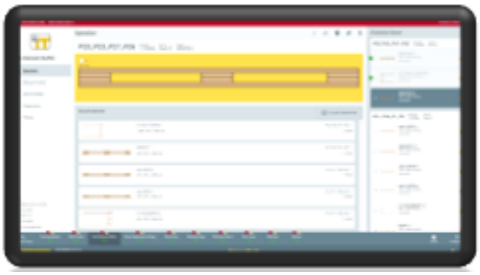


Buffer conveyor for sub-elements fed to Randek's framing station. It is easy to plan several sub-element and store these in right order on the conveyor. Buffer conveyor is advantageously used together with Randek's sub-element table (SAT1000).

Function description

- The sub-element is placed on the conveyor and fed forward.
- The buffer function plans the use of conveyor for maximal use.
- The sub-element is transported into the framing station, the operator places the sub-element into the framework.

SEBC-HMI



SEBC HMI is an interface and aid for the production of sub-elements. The HMI screen shows the planned production queue and component dimensions.

- The screen is placed near a sub-assembly table (in this case by purchaser). The operator can easily see what sub-element to produce.
- When the sub-element is finished, the operator places it on the sub-element conveyor and starts the next job in the queue.

SEBC

Chain conveyors adapted for sub-elements, where each chain conveyor is surrounded by photocells for automatic feeding of material. Each buffer zone can be filled with several sub-elements, all of which belong to one and the same building element.

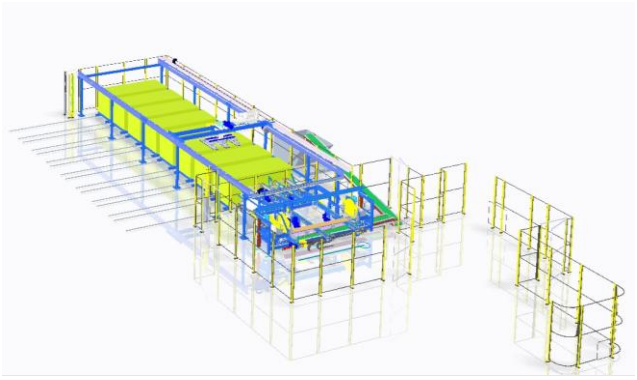
Technical description	
Max. height sub-element	3300mm
Max. width sub-element	3600mm

Infeed height	ca. 900mm

SEBC FR
Angle transfer with raisable chain beams. Motorized rollers for feeding the sub-element towards the framework station. The last rows of rollers are undriven and divided so that the operator can more easily move smaller sub-elements.

Art. No.	Description	Qty.
SEBC-HMI	Sub-Element Planning HMI	1
SEBC FR	Sub-Element Feeding Right	1
SEBC	Sub-Element Buffer Conveyor Section (for 2.1-3.3m width)	4

P3. Stud feeder



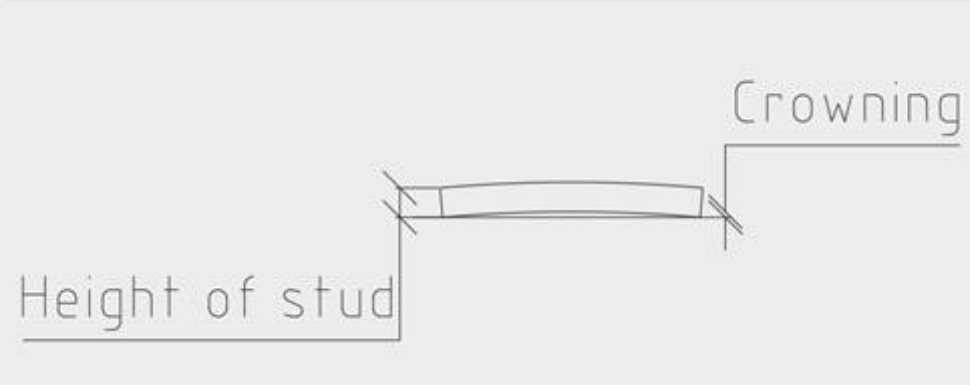
Randek's Stud Feeder is a machine that feed studs automatically to the framing station. An automatic vacuum picker picks stud layers from one of the different material slots, counts off the correct number of studs and return the rest if needed. The machine is CAD/CAM-controlled. FM3000 HMI also presents information regarding material status in the stud feeder.

Function description

- Operator fills the storage slot with wood packages.
- The vacuum picker goes from zero position to the given slot and is lowered to pick a layer of studs.
- The vacuum picker transports the studs to a driven buffer conveyor.
- A brush removes any spacer sticks from the studs.
- The conveyor unit counts out a given number of studs.
- The conveyor unit handles the studs and places them in a buffer.
- The wood picker picks up any remaining studs and returns them to the correct material slot.

Technical description	
Control system	CAD/CAM system.
Length limitation*	2010mm+300*n <max. 3300mm
Width limitation	Min. 63mm, Max. 245mm
Thickness limitation	Min. 35mm, Max. 45mm
Storage slots	4 extra storage slots (8 total)
Timber package loaded into a storage slot, limitations (LxWxH)	Max. 3300x1200x1200 mm

*The length interval of the studs for the machine is designed in steps from 2100mm and increases 300mm to 2400mm up to max. 3300mm.

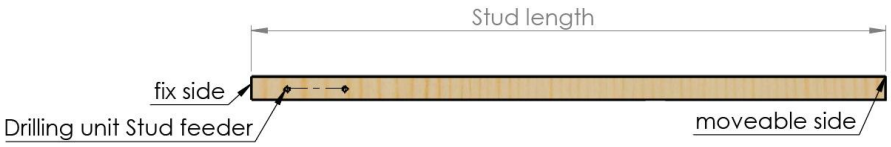


CCFS-Crown Check Function Stud
Crown Check is a function that controls the bending of the stud and corrects them, so they are in the right direction during the build-up of the frame.

Function description

- Laser measures the bending of the stud, min. indication is 2 mm.
- Turning for the stud to lie with the bend in the right direction.

DUS-Drilling Unit Stud

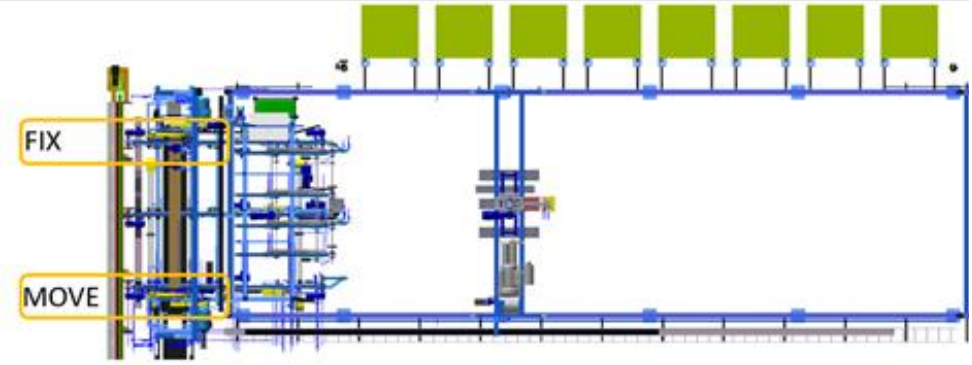


Drilling unit is a function for drilling holes in studs, the holes will simply be for electrical installations etc.

Function description

- Two fixed positions with drilling units for drilling of studs (can be adjusted manually).
- Integrated in the conveyor for control stud measurement.
- Holes are drilled on the upright side of the stud.
- Equipped with housing and outlet for connection to an external dust collection unit (dust collection system is not included).
- CAD/CAM-controlled.

Technical description	
Min. distance from fix side to first hole	310mm
Min. CC between drilling units	250mm
Max. distance from fix side, Second hole	1350mm
Standard placement from fix side to first hole	610mm
Standard placement from fix side to second hole	910mm



SF-TCSS Stud Feeder Trimming cut saw stud
Trimming Cut Saw Stud is a function to trim the studs either as a quality check to get higher accuracy for the wall elements, or to get customized stud lengths without need for third party saw. The standard-length studs will be cut directly in the production line using this function.

Function description

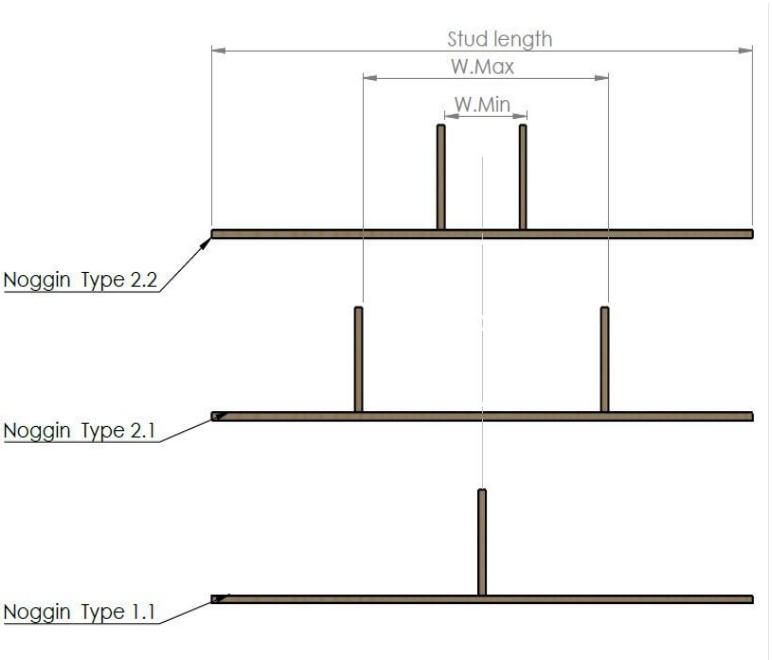
- Adjusts the stud to the correct length.
- Automatic setting of saw positions before cutting.
- Conveyor for recyclable material.
- CAD/CAM-controlled.

Technical description	
Saw on fixed side (FIX)	Adjustable 0-50mm (Manual)
Standard cutting fixed side	3-4mm
Saw on fixed side	Can be turned off in programs if incoming material is 100% reliable
Movable side saw (MOVE)	Max. Spill length 300mm
Moving side, movement	According to Shortest - longest stud max. = 1500mm
Tolerances	+-1mm

SF-Nog Add function for nogging machine
Add function to use studs from studfeeder in nogging machine, Studs will be feeded from checked stud to nogging machine.

Art. No.	Description	Qty.
SFESPVP4	4 Extra Stock Positions	1
SFDUS	Drilling Unit Stud	1
SFTCSS	Trimming Cut Saw Stud	1
SFCCFS	Crown Check Function Stud	1
SF	Stud Feeder	1
SF-Nog Add	Add function for nogging machine	1

P4. Robotic Noggin Handling System



Randek nogging handling automates the process of cutting, positioning and nailing the noggin to the stud. regardless of the deviations in width dimension of the stud, the placement of the noggin will be exactly when these are joined before cutting.

Function description

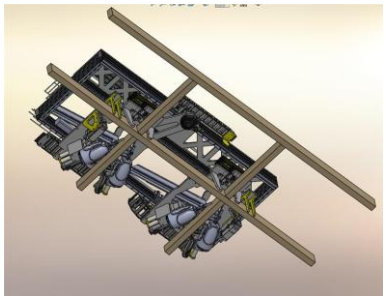
- The operator places the material for the noggin into the magazine.
- The studs are transported automatically into the machine from the stud feeder.
- Material for the noggin is cut to the right length according to the CDT-file.
- Stud and noggin are fixed and nailed with 2 nails.
- The stud with noggin is feed forward to the framing station.

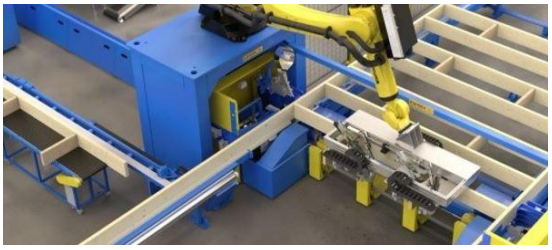
Technical description	
Studs	90-95x45mm
Max infeed length infeed material for noggins.	6000mm
Length studs	2100 – 3300 mm
Thickness noggin	45mm
Noggin	70x45mm
Length noggin	100-600mm
Personal safety	Safety net, doors with safety locks.
Connections	Electricity: 160A Air connection: 2x1100N / min (1”) Extraction connection (Extractor not included) diameter 100mm
Tool	Customization for one nail gun
Adapted for BeA Tool	TC PU 45-90mm (27.288.9008)*
Spacing requirements	Stud length, <=2700mm 1 piece noggin centered, >2700mm 2 piece noggin equal distributed.
Noggin. Placing	10mm from topside on stud
Max. distance between noggins (W. max.)	1300mm
Min. distance between noggin (W.min.)	500mm

NOTE! Nailing gun is not included. Brand and model are determined together with Randek AB.

General guidelines for tools:

- Designed for fitment in a machine and of industrial grade.
- Equipped with an (empty) magazine sensor.
- Must be equipped with sensors for firing (firing and empty chamber) alt.
- Must be available as CAD model .STP or equivalent format.
- Quick connections (electric and pneumatic) to the tool for changeover.
- M16 screw for attachment.





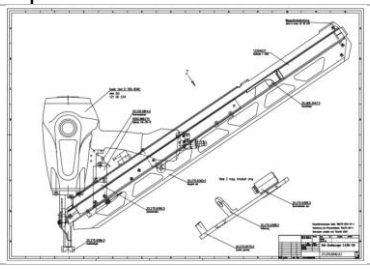
NHM-RNH-Robotic Noggin Handler

Robotic Noggin handler is a robotic system that automatically moves the finished stud with noggin from the Noggin machine into the framing station. And attaches it to the framework.

Function description

- The robot lifts the stud with the noggin with a gripper tool.
- The robot feeds the stud with the noggin or simpler studs in the framing station.

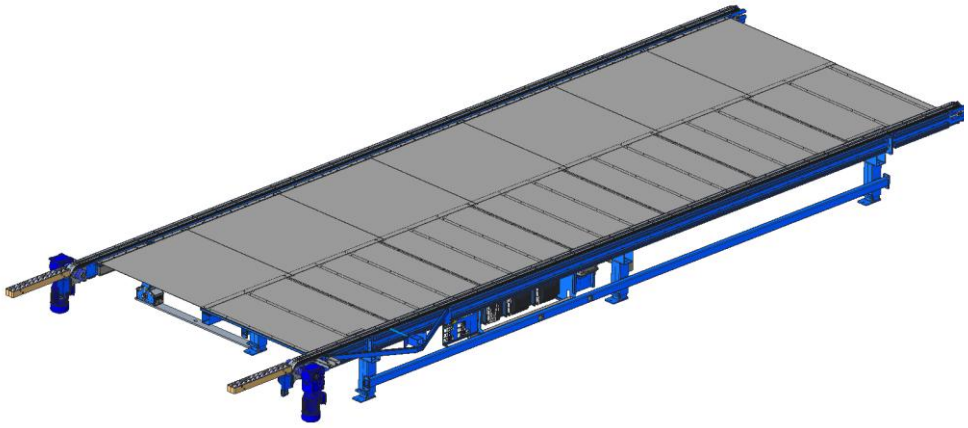
- The framing station nails the stud to the bottom and top plate, the robot nails the noggin into the latest placed stud.
- Robot lifts the next noggin and continues until the framework is completed.
- The robot switches tools and nails the last stud into to the last noggin.

Technical description	
Robot	Kuka KR 210 R3300-2 K
Adapted for nailtool	4 pcs of BeA D 100-934C
Adapted for nailtool	
Length noggin	100-600mm
Personal safety FM3	Area Scanners
Mounted	Fixed in one position

NOTE! Nailing gun is not included. Brand and model are determined together with Randek AB.

Art. No.	**Description**	**Qty.**
NHMNM	Noggin Machine	1
NHMRNH	Robotic Noggin Handler	1

P5. Working Table



Working table is used to safely transport and process the wall element. Chain conveyors transport the wall element, the motorized width adjustment is adjusted to fit incoming wall elements.

MT-074
The machine consists of a basic frame and a width-adjustable side that can be adjusted depending on the size of the wall element (MT-default=2,1m-3,3m eller MT-EXT=2,4m-3,9m). In its basic version, the frame is 700mm high from the bottom edge of the foot to the top edge of the chain conveyer. The machine's feet can be individually adjusted for unevenness in the floor.

MTE-060
Table adapted for wall element.

Technical description	
Maximum element length	6000mm
Minimum element length	1200mm

MT-ASC
Safety scanners between station.
The function enables working around the station.
Reset on station control board.

MT-Left Default
The station is adapted for 2100-3300mm width on the wall elements.
Left side fixated in flow direction.

MT-Standard/MT-CHB
The station is equipped with flat chain conveyers for transport of the element. With a feed speed of 1,0 m/s.

MT-CHB is a number of chain conveyers the table is equipped with. Number of conveyers defines the maximum load for the station.

Technical description	
Adapted for widespread maximum weight	750kg
Type of flat chain	Steel

MT-SALO
The saloon hinges are mounted at the drive end of the table These can be angled to allow a passing passage. Requires associated security for approved passage. Can limit automatic movement of shorter and lighter elements.

MT-CDT
The table is adjusted according to the data from the loaded CDT file. The PLC adjusts the width adjustment and informs table-connected systems which wall element is on the table.

MT-Control
Keypad for the station containing controls for forward motion and emergency stop

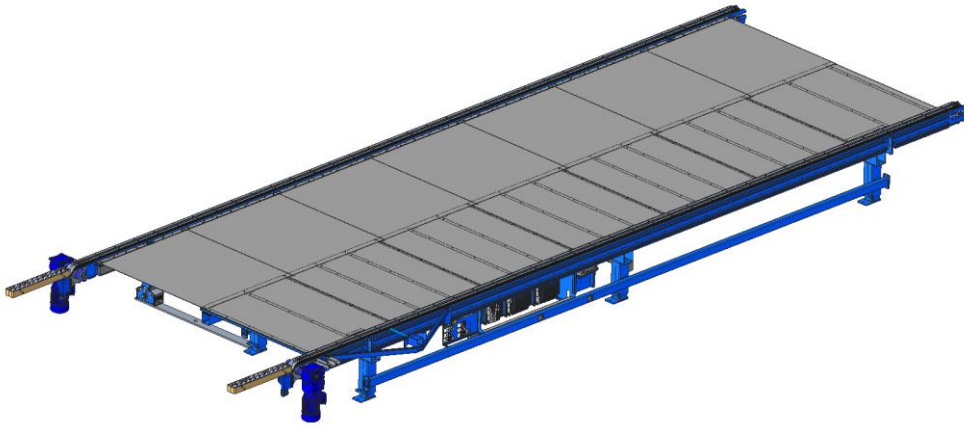
MT-Y
Y-stops are mounted on the C-rails of the chain conveyors The stops guide and clamp the top and bottom plate along the full length of the element.
The clamping function is activated when the element has stopped.

MT-X
X-Stops are mounted at the drive end of the table to secure the stop of the element in the station.

MT-Plate
Cover plates are used when only two chain conveyers are used. The cover plates are preventing the operator from standing inside the machine but add the opportunity to work on top of the plate.

Art. No.	Description	Qty.
MT-074	Table Frame	1
MTE-060	Element Length Adaption 6m	1
MT-standard	Adapted for standard weight element	1
MT-Left 3300	Fix side Left 3300	1
MT-SALO	Saloon Doors	1
MT-Plate	Protected by plates	1
MT-Y	Y- function	1
MT-X	X-Function	1
MT-CDT	CDT adapted	1
MT-Control	Control panel	1
MT-ASC	Area safety scanners	1
MT-CHB	Chain conveyer	2

P6. Working Table



Working table is used to safely transport and process the wall element. Chain conveyors transport the wall element, the motorized width adjustment is adjusted to fit incoming wall elements.

MT-074
The machine consists of a basic frame and a width-adjustable side that can be adjusted depending on the size of the wall element (MT-default=2,1m-3,3m eller MT-EXT=2,4m-3,9m). In its basic version, the frame is 700mm high from the bottom edge of the foot to the top edge of the chain conveyer. The machine's feet can be individually adjusted for unevenness in the floor.

MTE-060
Table adapted for wall element.

Technical description	
Maximum element length	6000mm
Minimum element length	1200mm

MT-ASC
Safety scanners between station.
The function enables working around the station.
Reset on station control board.

MT-Left Default
The station is adapted for 2100-3300mm width on the wall elements.
Left side fixated in flow direction.

MT-Standard/MT-CHB
The station is equipped with flat chain conveyers for transport of the element. With a feed speed of 1,0 m/s.

MT-CHB is a number of chain conveyers the table is equipped with. Number of conveyers defines the maximum load for the station.

Technical description	
Adapted for widespread maximum weight	750kg
Type of flat chain	Steel

MT-SALO
The saloon hinges are mounted at the drive end of the table These can be angled to allow a passing passage. Requires associated security for approved passage. Can limit automatic movement of shorter and lighter elements.

MT-CDT
The table is adjusted according to the data from the loaded CDT file. The PLC adjusts the width adjustment and informs table-connected systems which wall element is on the table.

MT-Control
Keypad for the station containing controls for forward motion and emergency stop

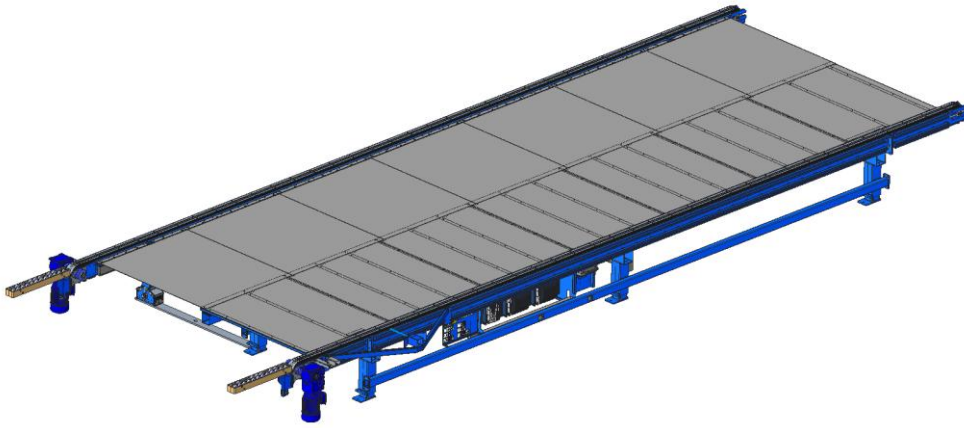
MT-Y
Y-stops are mounted on the C-rails of the chain conveyors The stops guide and clamp the top and bottom plate along the full length of the element.
The clamping function is activated when the element has stopped.

MT-X
X-Stops are mounted at the drive end of the table to secure the stop of the element in the station.

MT-Plate
Cover plates are used when only two chain conveyers are used. The cover plates are preventing the operator from standing inside the machine but add the opportunity to work on top of the plate.

Art. No.	Description	Qty.
MT-074	Table Frame	1
MTE-060	Element Length Adaption 6m	1
MT-standard	Adapted for standard weight element	1
MT-Left 3300	Fix side Left 3300	1
MT-SALO	Saloon Doors	1
MT-Plate	Protected by plates	1
MT-Y	Y- function	1
MT-X	X-Function	1
MT-CDT	CDT adapted	1
MT-Control	Control panel	1
MT-ASC	Area safety scanners	1
MT-CHB	Chain conveyer	2

P7. Working Table



Working table is used to safely transport and process the wall element. Chain conveyors transport the wall element, the motorized width adjustment is adjusted to fit incoming wall elements.

MT-074
The machine consists of a basic frame and a width-adjustable side that can be adjusted depending on the size of the wall element (MT-default=2,1m-3,3m eller MT-EXT=2,4m-3,9m). In its basic version, the frame is 700mm high from the bottom edge of the foot to the top edge of the chain conveyer. The machine's feet can be individually adjusted for unevenness in the floor.

MTE-060
Table adapted for wall element.

Technical description	
Maximum element length	6000mm
Minimum element length	1200mm

MT-Left Default
The station is adapted for 2100-3300mm width on the wall elements.
Left side fixated in flow direction.

MT-Standard/MT-CHB
The station is equipped with flat chain conveyers for transport of the element.
With a feed speed of 1,0 m/s.

MT-CHB is a number of chain conveyers the table is equipped with. Number of conveyers defines the maximum load for the station.

Technical description	
Adapted for widespread maximum weight	750kg
Type of flat chain	Steel

MT-CDT
The table is adjusted according to the data from the loaded CDT file. The PLC adjusts the width adjustment and informs table-connected systems which wall element is on the table.

MT-Control
Keypad for the station containing controls for forward motion and emergency stop

MT-Y
Y-stops are mounted on the C-rails of the chain conveyors The stops guide and clamp the top and bottom plate along the full length of the element.
The clamping function is activated when the element has stopped.

MT-X
X-Stops are mounted at the drive end of the table to secure the stop of the element in the station.

MT-Plate
Cover plates are used when only two chain conveyers are used. The cover plates are preventing the operator from standing inside the machine but add the opportunity to work on top of the plate.

NOTE! No passage between conveyor and robot cell.

Art. No.	Description		Qty.
MT-074		Table Frame	1
MTE-060		Element Length Adaption 6m	1
MT-standard		Adapted for standard weight element	1
MT-Left 3300		Fix side Left 3300	1
MT-Plate		Protected by plates	1
MT-Y		Y- function	1
MT-X		X-Function	1
MT-CDT		CDT adapted	1
MT-Control		Control panel	1
MT-CHB		Chain conveyer	2

P8. Working Table

Working table is used to safely transport and process the wall element. Chain conveyors transport the wall element, the motorized width adjustment is adjusted to fit incoming wall elements.

There will be no possibility for the operator to cross the line between this table and robotic cell.

MT-074
The machine consists of a basic frame and a width-adjustable side that can be adjusted depending on the size of the wall element (MT-default=2,1m-3,3m eller MT-EXT=2,4m-3,9m). In its basic version, the frame is 700mm high from the bottom edge of the foot to the top edge of the chain conveyer. The machine's feet can be individually adjusted for unevenness in the floor.

MTE-060
Table adapted for wall element.

Technical description	
Maximum element length	6000mm
Minimum element length	1200mm

MT-ASC
Safety scanners between station.
The function enables working around the station.
Reset on station control board.

MT-Left Default
The station is adapted for 2100-3300mm width on the wall elements.
Left side fixated in flow direction.

MT-Standard/MT-CHB
The station is equipped with flat chain conveyers for transport of the element.
With a feed speed of 1,0 m/s.

MT-CHB is a number of chain conveyers the table is equipped with. Number of conveyers defines the maximum load for the station.

Technical description	
Adapted for widespread maximum weight	750kg
Type of flat chain	Steel

MT-SALO
The saloon hinges are mounted at the drive end of the table These can be angled to allow a passing passage. Requires associated security for approved passage. Can limit automatic movement of shorter and lighter elements.

MT-CDT
The table is adjusted according to the data from the loaded CDT file. The PLC adjusts the width adjustment and informs table-connected systems which wall element is on the table.

MT-Plate
Cover plates are used when only two chain conveyers are used. The cover plates are preventing the operator from standing inside the machine but add the opportunity to work on top of the plate.

NOTE! No passage between robot cell and conveyor.

Art. No.	Description	Qty.
MT-074	Table Frame	1
MTE-060	Element Length Adaption 6m	1
MT-standard	Adapted for standard weight element	1
MT-Left 3300	Fix side Left 3300	1
MT-SALO	Saloon Doors	1
MT-Plate	Protected by plates	1
MT-CDT	CDT adapted	1
MT-Control	Control panel	1
MT-ASC	Area safety scanner	1
MT-CHB	Chain conveyer	2

P9. ZeroLabor Robot Cell Buffer Table - ZLBT

Transport and buffer table for building elements in horizontal position. Equipped with flat-chain conveyors and frequency-controlled drive for effective and careful transport. The table receives data of the walls by their ID.

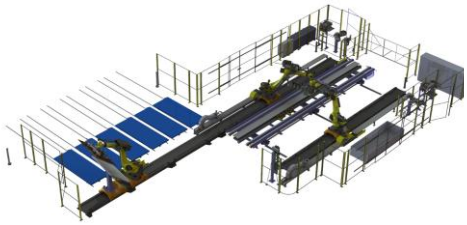
Function description

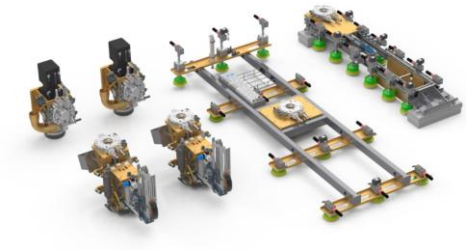
- The building element is transported to the next station.
- The element is moved into the station from the previous one, a photocell detects its position.
- The element stays at the current station until the next station is available.
- Width is automatically adjusted to specification in CDT-file.

Technical description	
Length, wall element	6000m
Width, wall element	2100 - 3300 mm
Automation level	CDT adapted
Fixed side	Left
Max. transport speed	1 m/s
Max. weight element	1000kg

Art. No.	**Description**	**Qty.**
ZL-BT 060	Infeed table ZL3	1

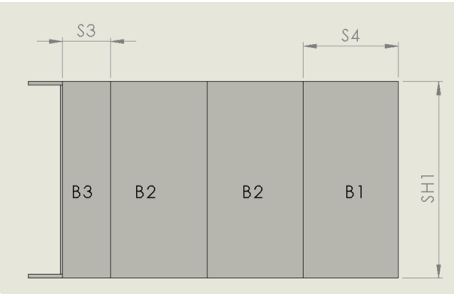
P10. ZeroLabor Robotic Cell – 3 robot version





ZL3-6 meter

ZeroLabor from Randek is a fully automatic robot system for handling and processing building elements. The system is flexible and can be configured according to the buyer's needs. It is easily integrated into new- and existing production lines but can also be used as a standalone unit. ZeroLabor can handle various forms of building elements such as walls, floors, and ceilings.



Function description

- The robot cell operates automatically according to instructions generated from CAD data for the current building element. The CAD data is either loaded manually at the HMI or carried over from the previous machine.
- One robot is dedicated to laying boards. The other two robots work independently to completely fasten one board each. This increases efficiency compared to using only two robots, as in that case the boards are only lightly fastened enough for them to stay in place while one robot places boards, after which the complete fastening is done by both robots. Additionally, there is no need for tool change to or from the board tool.

- Board placement: Robot pick a board B1 with dimensions [SH1]x[S4] from magazine and place this on zero-point position, SH1 is the element board height. On position B2 the robot places a board from magazine with height SH1. On position B3 the robot can the last board with height SH1 with max. 40% overhang. The board can be processed to right dimensions S3.
- When switching to a new set of tasks, a robot changes tool if necessary.
- The system alerts operators that tool magazines are running low. A safe procedure for the tool-magazine refilling is later carried out by the operators. During this refill, the other robot or robots can continue to work.
- Additionally, the robots can prepare holes for doors, windows, electrical boxes, ventilation, and so on.
- Cut-out board material are sorted into a recycling bin. If a piece is too small to pick up, it is not cut out completely but left fastened in a few points to be punched out manually outside of the cell.
- If needed, the procedure is repeated by the robots for additional board layers.

Technical description	
Robots	3 industrial robots with 6 axes placed on rails for movement along the element
Safety	Gates with safety locks and LOTO
Requirements for concrete foundation	According to appendix Concrete R-000210(C)
Requirements for installation surface of concrete floor	C20/25 according to DIN EN 206:12001/DIN 1045-2:2008
Max. floor screed thickness	20mm
Requirements electricity	80A 100A
Pneumatic consumption	~1500NL/min@8Bar (1" connection)
Extraction connections	Nominal airflow @ 23 m/s: >650 m3/h Static pressure @ max. airflow: -12 kPa Filter demands: <0.1 mg/m3 emissions (Valid for all robot equipment with routing tool)
Requirements for minimum ceiling height	Min. 4500mm
Fixed side	Left
Max. transport speed	1 m/s
Element thickness	Max. 350 mm
*for connecting to external/central system.	

ZL-RBM

The station is equipped with sheet wagons customized according to the max. dimensions of the sheet-laying tool. The wagons are transported out of the robots' working area when refilling with new sheets.

ZL-HMI

The station is equipped with an HMI for easy control over the station.
On the control panel the operator can see element status, fastening status.

ZL-RTSH 33
Sheet-laying tool for sheets up to 3300 mm. If 3-robot cell, the tool will be placed on the 3rd robot. The tool can be parked in its tool parking slot in a 2-robot cell.

ZL-RBS
The table is equipped with a support function to aid cutting off excess sheet on the back end of the wall.

ZL-RTRE
Recycling tool with vacuum function to lift cut-out sheet pieces. Can be changed and parked at its included parking-slot stand.

Technical description	
Minimum handling size, recycling tool	700x700 mm

ZL-RWT 6 m
Table adapted for robot cell, with squaring function as standard.

ZL-RSCU 6 m
The table is equipped with stud correctors to straighten the studs before fastening.

ZL-RTRO
The robots are equipped with a rotating milling unit that is connected to the pre-existing extraction system. The unit does not have its own parking slot and is mounted on the robot.

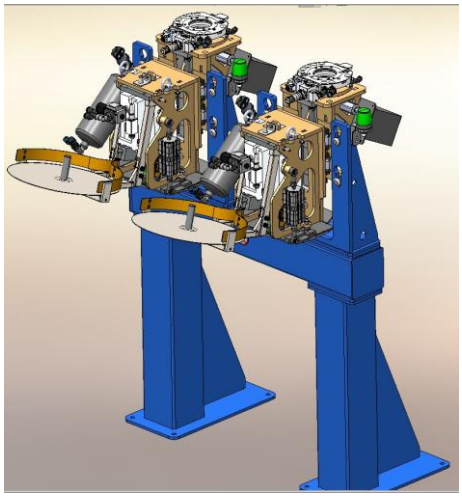
ZL-RTP C
Tool holder adapted for approved clamping tools. The robot can leave the tool at the tool parking slot when refilling the magazine or when changing to another tool.

ZL-RTSC
Tool holder adapted for preselected screwing tool. The robot can leave the tool at the tool parking slot when refilling the magazine or when changing to another tool.

Technical description	
C-C Distance between screw heads	200mm (Default value)
Typ of Screw	Collated screws
Delivered in Screwband	500 Pcs/band
Adapt for Screw dimension	Ø3,5-5,5mm L=25-75mm

ZL-SO
Automatic gate for in- and outfeed of wall elements.

ZL-TBI



Individual button and dynamic light indication for refill and/or service with acknowledge clearing.
Green = Tool OK.
Yellow = Tool is empty, refill tool.
Red = Service needed (e.g. possible jam).

Each status is acknowledged with a push of the corresponding button. Light and button can be mounted on tool rack or fence.

NOTE! Nailing gun and stapling gun are not included. Brands and models are determined together with Randek AB.

General guidelines for tools:

- Designed for fitment in a machine and of industrial grade.
- Equipped with an (empty) magazine sensor.
- Must be equipped with sensors for firing (firing and empty chamber) alt.
- Must be available as CAD model .STP or equivalent format.
- Quick connections (electric and pneumatic) to the tool for changeover.
- M16 screw for attachment.

Art. No.	Description	Qty.
ZL3-060	ZeroLabor robot system for 6-meter wall elements	1
ZL-RBM	Sheet slots	6
ZL-RTRE	Recycling tool	1
ZL-RTP C	Tool holder for stapling-tool power unit	4
ZL-RTSC	Screwing tool	2
ZL-RTRO	Milling tool	2
ZL-SO	Safe outfeed of element	2
ZL-RTSH 33	Sheet handling 3.3m	1
ZL-RWT 60	ZeroLabor table 6.0m	1
ZL-RSCU 060	Stud corrector 6m	1
ZL-RBS	Board support function	1
ZL-TBI-4	Tool-bay Indicators (on 6 tools)	1

P11. Working Table

Working table is used to safely transport and process the wall element. Chain conveyors transport the wall element, the motorized width adjustment is adjusted to fit incoming wall elements.

MT-074MT-074
The machine consists of a basic frame and a width-adjustable side that can be adjusted depending on the size of the wall element (MT-default=2,1m-3,3m eller MT-EXT=2,4m-3,9m). In its basic version, the frame is 700mm high from the bottom edge of the foot to the top edge of the chain conveyer. The machine's feet can be individually adjusted for unevenness in the floor.

MTE-060
Table adapted for wall element.

Technical description	
Maximum element length	6000mm
Minimum element length	1200mm

MT-ASC
Safety scanners between station.
The function enables working around the station.
Reset on station control board.

MT-Left Default
The station is adapted for 2100-3300mm width on the wall elements.
Left side fixated in flow direction.

MT-Standard/MT-CHB
The station is equipped with flat chain conveyers for transport of the element.
With a feed speed of 1,0 m/s.

MT-CHB is a number of chain conveyers the table is equipped with. Number of conveyers defines the maximum load for the station.

Technical description	
Adapted for widespread maximum weight	750kg
Type of flat chain	Steel

MT-SALO
The saloon hinges are mounted at the drive end of the table These can be angled to allow a passing passage. Requires associated security for approved passage. Can limit automatic movement of shorter and lighter elements.

MT-CDT
The table is adjusted according to the data from the loaded CDT file. The PLC adjusts the width adjustment and informs table-connected systems which wall element is on the table.

MT-Control
Keypad for the station containing controls for forward motion and emergency stop

MT-Plate
Cover plates are used when only two chain conveyers are used. The cover plates are preventing the operator from standing inside the machine but add the opportunity to work on top of the plate.

Art. No.	Description	Qty.
MT-074	Table Frame	1
MTE-060	Element Length Adaption 6m	1
MT-standard	Adapted for standard weight element	1
MT-Left 3300	Fix side Left 3300	1
MT-SALO	Saloon Doors	1
MT-Plate	Protected by plates	1
MT-CDT	CDT adapted	1
MT-Control	Control panel	1
MT-ASC	Area safety scanners	1
MT-CHB	Chain conveyer	2

P12. Working Table

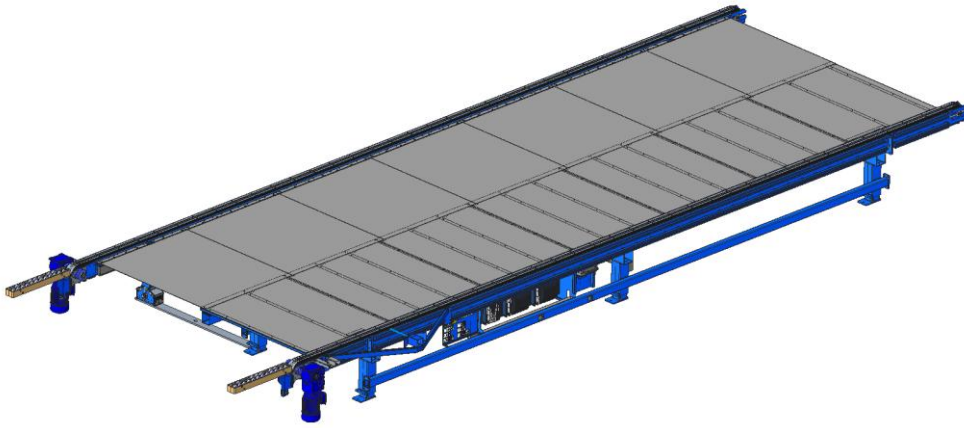


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Table adapted for wall element.

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The station is equipped with flat chain conveyers for transport of the element.
With a feed speed of 1,0 m/s.

MT-CHB is a number of chain conveyers the table is equipped with. Number of conveyers defines the maximum load for the station.

Technical description	
Adapted for widespread maximum weight	750kg
Type of flat chain	Steel

MT-CDT
The table is adjusted according to the data from the loaded CDT file. The PLC adjusts the width adjustment and informs table-connected systems which wall element is on the table.

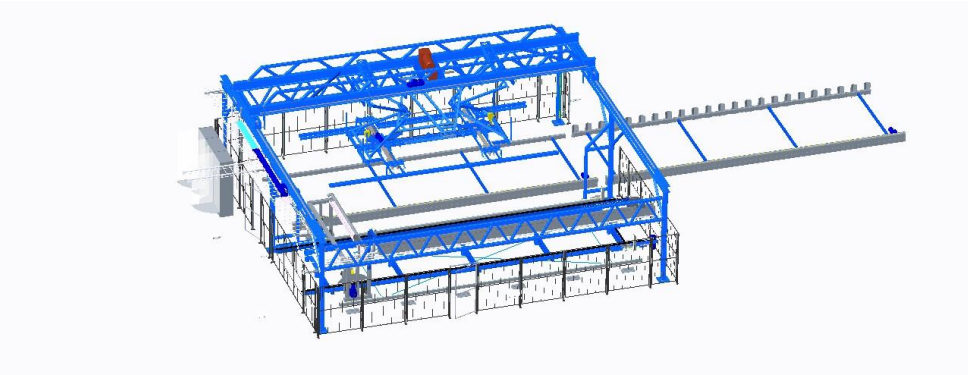
MT-Control
Keypad for the station containing controls for forward motion and emergency stop

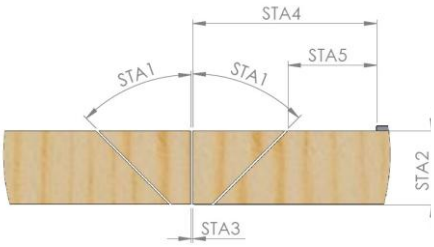
MT-Plate
Cover plates are used when only two chain conveyers are used. The cover plates are preventing the operator from standing inside the machine but add the opportunity to work on top of the plate.

NOTE! No passage between conveyor and stacker.

Art. No.	Description	Qty.
MT-074	Table Frame	1
MTE-060	Element Length Adaption 6m	1
MT-standard	Adapted for standard weight element	1
MT-Left 3300	Fix side Left 3300	1
MT-Plate	Protected by plates	1
MT-CDT	CDT adapted	1
MT-Control	Control panel	1
MT-CHB	Chain conveyer	2

P13. Stacker





STCB Stacker Cutting Bridge
Stacker Cutting Bridge is a saw bridge designed for splitting of multiwall to separate wall segments.

Function description
The wall elements are cut to the correct length by the cutting bridge. The principle is to merge smaller wall elements into one longer element, making the production balanced and enables a higher output. This station also cut waste from bottom and top plate in the end of the panel if required.

Horizontal or angle cutting for ordinary walls or cutting of bay window walls.

Technical description
• Cutting Bridge equipped with saw unit for cutting of multiwall.
• Horizontal or angle cutting for ordinary walls or cutting of bay window walls.

STCS Stacker Cut station
Stacker Cut Station is station designed for cutting multiwall to segments.

Function description

- The wall elements are cut to the correct length in this station. The principle is to merge smaller wall elements into long full elements making the production balanced and enables a higher output of the line. This station also cut out recyclable material from the bottom and top plate in the end of the panel if required.

STLU Stacker Lifting Unit
The Lifting unit move the incoming wall elements to a ready stack of wall elements.

Function description

- The lifting device picks up the wall element from the cut station and places it according to the information from the Randek Stacking Software.
- When the stack is completed, the operator gives a signal by pushing a button to start the out-feed on the chain conveyors, or the operator can choose to stack the next stack on top of the first one (if there is space left). The machine will not place more wall elements if the stack reaches maximum height.
- All manual work on the stack is done after it is moved out from the station. For safety reason no manual work is allowed inside the stacker.

STT Stacker Transporter
STT Stacker Transporter is a station designed to stack walls on top of, move entire stack of walls to end position and enable removing stack of walls using forklift.

Function description

- Wall element stack is transported out after completed stacking.

Technical description	
Length, building element	6.0 meter
Width, wall element	2100 - 3300 mm
Automation system	3000
Fixed side	Left
STLU unique	Lifting Unit for moving walls over to the outfeed section.
STLU unique	The bridge has a motor driven lifting device and has automatic adjustment for different wall heights. Positioning of the bridge is made with information from the Randek Stacking Software.
Max. lifting weight	1000kg
STCS unique	Two chain conveyors.
STCS unique	Motor for width adjustment.
STCB unique	Cutting Bridge equipped with saw unit for cutting of multiwall.
STCB unique	Horizontal or angle cutting for ordinary walls or cutting of bay window walls.
Measure STA1	0-45 degrees
Measure STA3	3.5-5mm
Measure STA4	80-500mm depending on STA1
Measure STA5	100-720mm depending on STA1
Max. element thickness	245mm
Max. stacking height	1600mm
Stacked weight	7500 kg
Fixed side	Right to left

Art. No.	Description	Qty.
STCB-060	Stacker Cutting Bridge	1
STCS-060	Stacker Cut Station	1
STLU-060	Stacker Lifting Unit	1
STTL-060	Stacker Conveyor in cell	1
STT-060	Stacker Transporter	1

P14. IIoT platform

Randek's go-to platform for Industrial IoT connecting people and machines via cloud services with the end purpose to create new customer values, data-driven decisions and optimizing business models.

The platform and its connected hardware offer possibilities to gather data and user-friendly tools to analyse, monitor and create reports. It enables data analysis from a supplier point of view to optimize the machine availability for the user.

Basic installation includes:

- Data collection from each machine generating data in the machine line.
- Possibilities to analyse separate work shifts and data associated with them.
- Breakdown of data to each individual building element in a project.
- Data collection for alarms and an overview of the 10 most common ones over a set time.
- Data collection of waiting time for each machine up- and downstream.
- Measurement of current cycle time and a comparison to historic cycle time.
- Data collection of:
  - Output (linear meters) per hour, shift, week.
  - Number of fasteners used.
  - Number of boards used.
- One data package is included, covering 100 data tags per second.

Art. No.	Description	Qty.
IIoT-Inst RDK	Hardware, installation on new line at Randek, and set-up	1
IIoT-Sub W	12 months access, Wall line	1