

Operating Manual

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Spraycoater KU451
Machine No. 07.2450.10

Pumping station KU550
Machine No. 07.2451.08



Customer:

Connection Values / Technical Data

Spray-Coater

Current supply	3x400V / 50Hz / max. 32A
Compressed air	6 bar / approx. 600l/min
Total Exhaust Air	approx. 500 m ³ /h
Exhaus Ventilator Intenal Space	Elektror D064 1 kW / 3x400V / 50Hz
Drive Oszillation Sprayhead	Servomotor 400 W R7M-A40030-S1, OMRON With linear unit
Drive Transport System	Ex-Motor 180 W EAFY63/4B-7, Flender Worm Gear i=40 MVF 30, Bonfiglioli
Drive Lacquer Collecting Belts	Ex-Motor , 120W B63A4B3 Bonfiglioli Step-down Gear 1:6
Drive Width Adjustment	Ex-Motor , 120W B63A4B3 Bonfiglioli Step-down Gear 1:50
Drive Lacquer Pump	3x230VAC/370W Step-down Gear 1:10
Sprayair Temperature Monitoring	PT 100 7138-1-PT-P-10, EHS
Temperature Control Unit	Software Controller with PID behavior
Security Thermostate	mech. Switch EM-5/N2, JUMO
Excess Temperature Security	Temperature Probe PT 100 7138-1-PT-P-10, EHS
Heating	Spray Air 2kW Horn Air 2kW all4-PCB

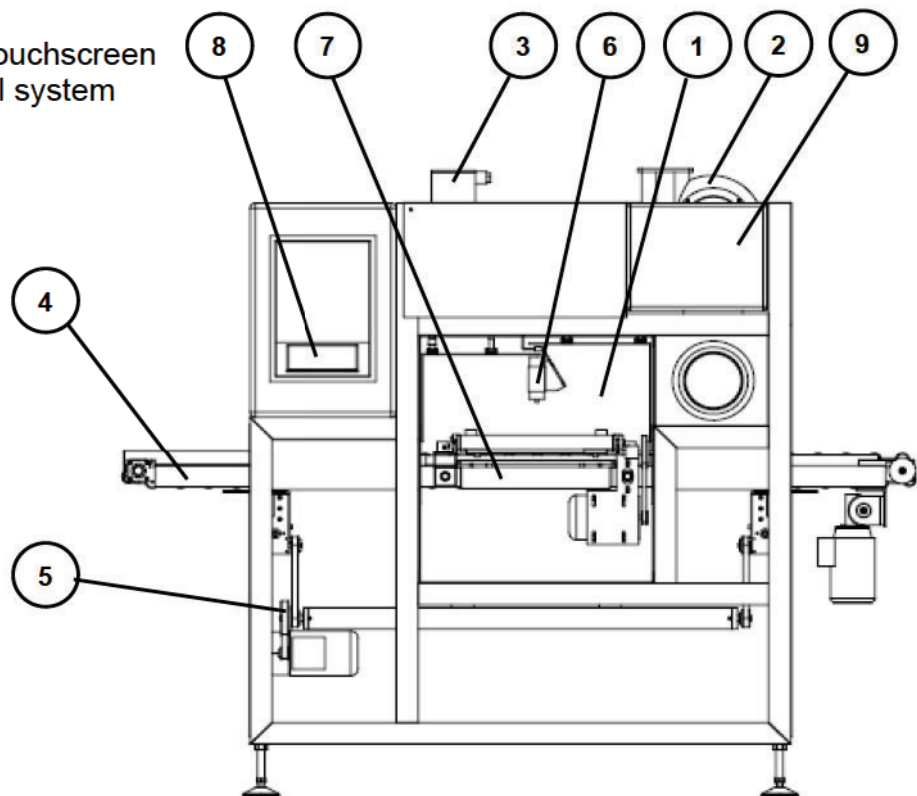
Spraycoater KU451

Quality characteristics:

- Modular design with observance of pertinent standards.
- Full integration capability in upstream or downstream processing cycles, depending on the level of automation
- Dimensioned for continuous operation (multiple shift)
- High productivity and low labour requirement
- On the process and control engineering side, all modules of the spraycoater are interlinked via a freely programmable control system through the main switchgear and control cabinet
- User-friendly control console for simple operation
- Integrated MODEM for diagnostic purposes via service center (optional)
- Lacquer saving by lacquer recycling
- Less pollution by the sealed cabin

The spraycoater is made up of the following components:

1. Spray cabin
2. Air extraction system
3. Air heater
4. Transportsystem
5. Width adjustment system
6. Sprayhead
7. Lacquer recycling
8. Control system Touchscreen
9. Pneumatic control system

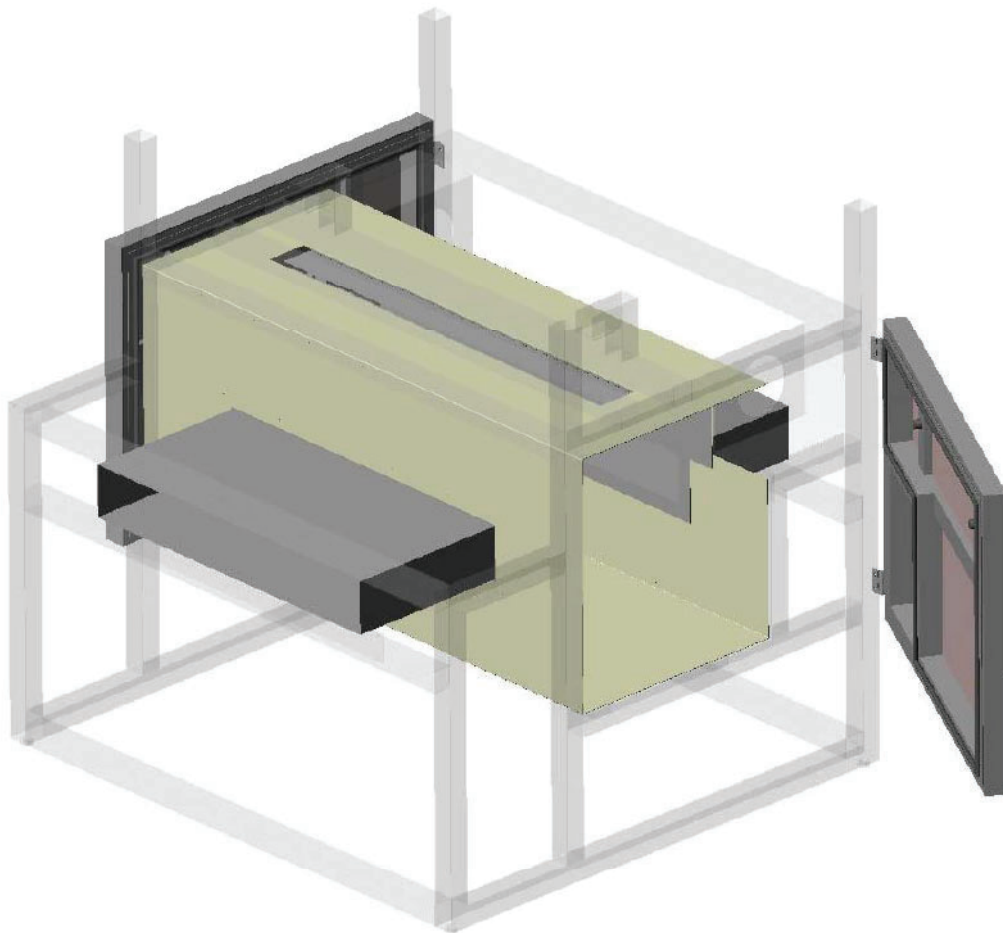


1. Spray cabin

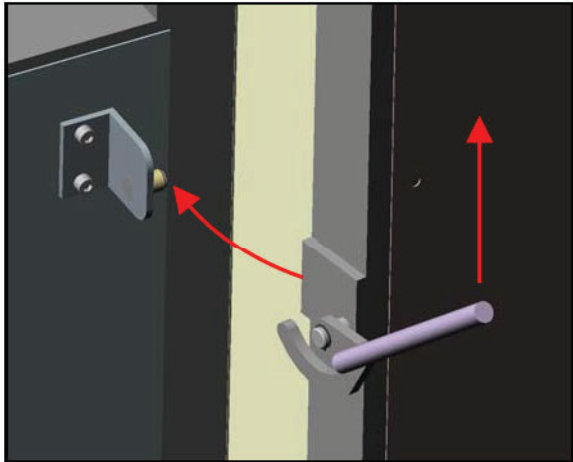
The spray cabin is tightly built of stainless sheet metal. Two massive doors cover the cabin on both sides. A rubber gasket on each of these doors will be pressed to the frame when the doors are closed. At the same time the two rubber plugs get pushed to the filter handles for tightening the filter housing to the air extraction system.

The inner side of the cabin has a smooth surface for a better cleanig. Additional there are two angular sheets fit to the top of spray cabin. These sheets can either be changed, or cleaned outside of the machine.

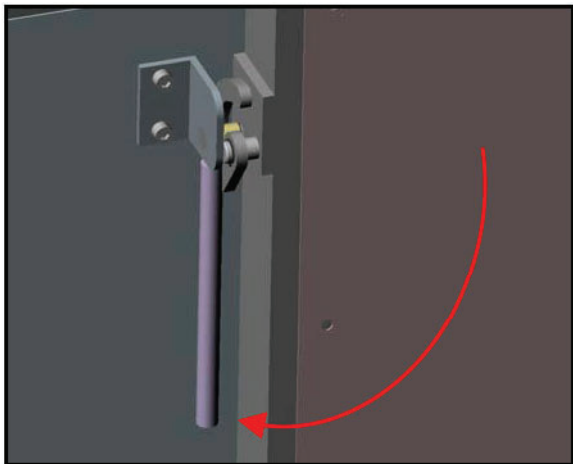
There is a door limit switch on each door to control that the doors are closed while processing. Once a door is opened while the automatic process is still running, the machine stops immediately, like an emergency stop.



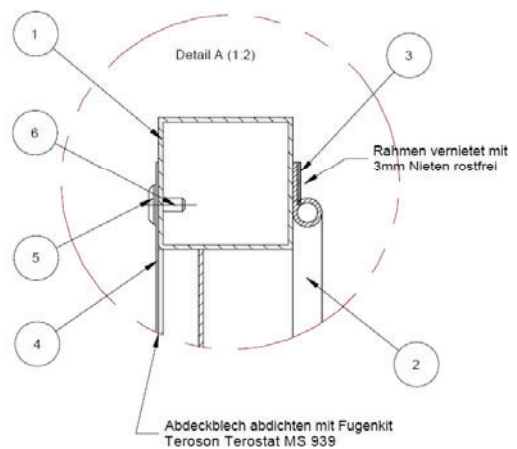
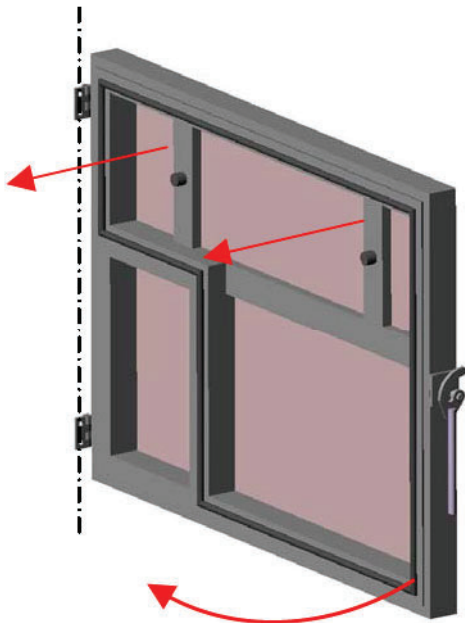
Doors



To lock the door lift up the handle and hook it into the bolt.



Don't slam the door. The handle must be lifted up before locking the door.

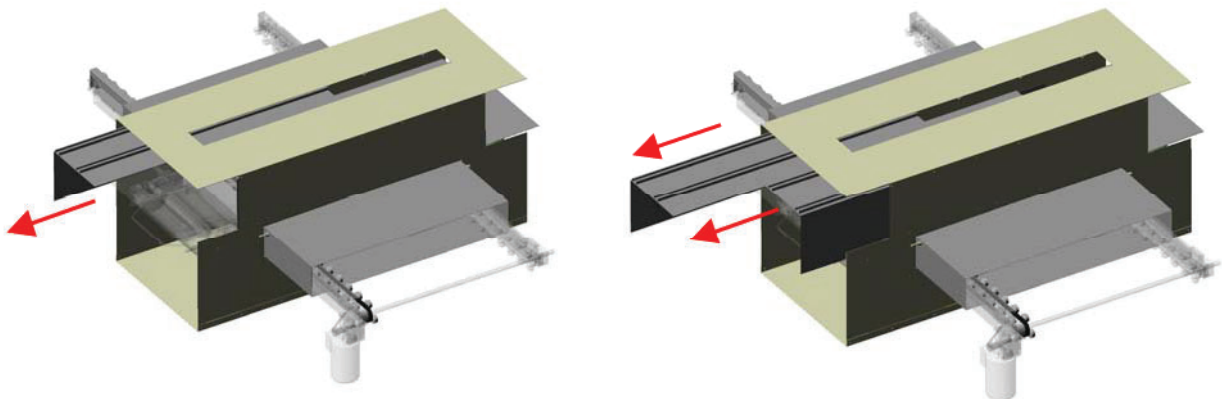


Cleaning the spray cabin

Die Spraykabine und der Spraykopf sind täglich, bei Arbeitsende zu reinigen. Die Kabinenbleche sind dazu bequem zu entfernen.

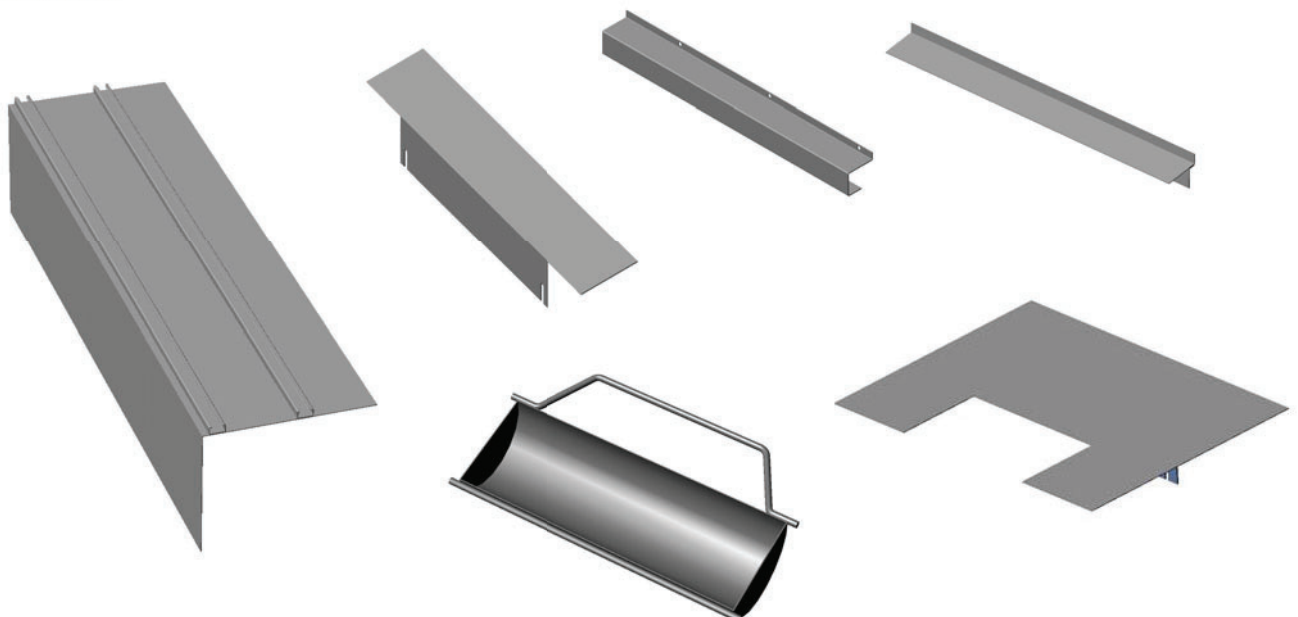
Vorgehen:

1. Open the doors and remove the filters
2. Remove the collecting belts and the collecting tray
3. Remove the angular sheets
4. Remove the chain protecting sheets
5. Replace the paper
6. Remove the sprayhead
7. Clean the cabin
8. Clean all the components to be reassembled



Remove the angular sheets

cabin sheets

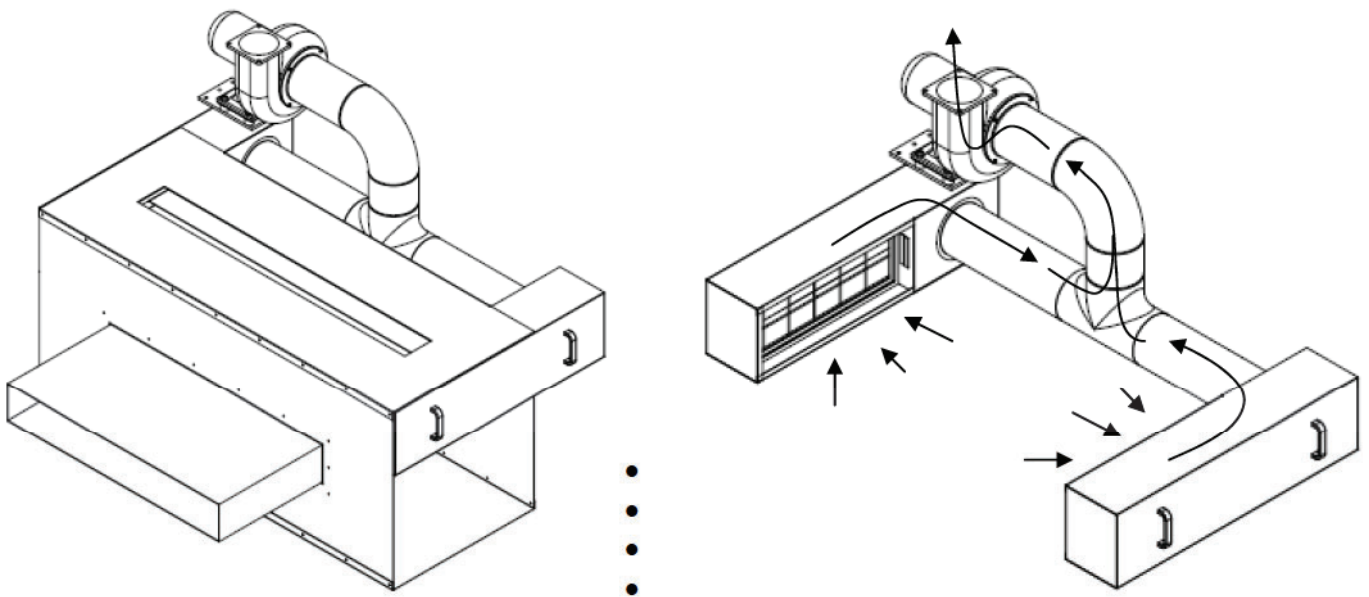


2. Air extraction system

Extraction concept

The spray cabin is built up tight with three inlet openings (opening sprayhead, machine inlet and outlet). In the cabin is a vacuum caused by the ventilator. Therefore the solvent vapor is extracted and filtered in the filter cases. The filter cases are placed on both sides of the cabin and fixed by locking the doors.

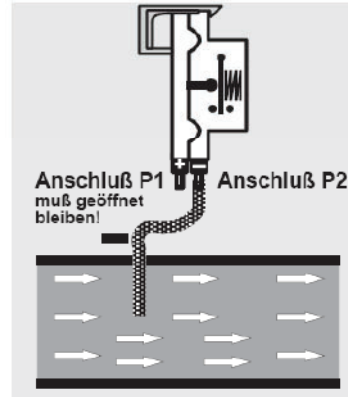
A support on the roof of the cabin carries the filter housing and beware of installing the wrong way.



The inner side of the spray cabin is declared as a explosion-proof zone. The extraction system must be in function while processing.

Extracion monitoring

The operability of the air extraction system is essential for an automatic process. Therefore the system is controlled by a differential air pressure detecting system.



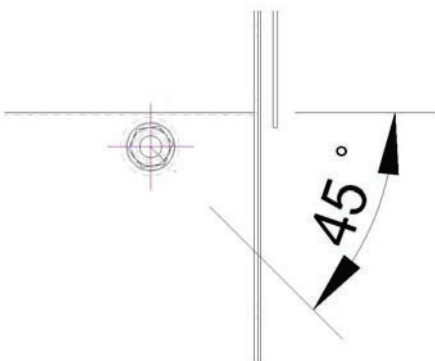
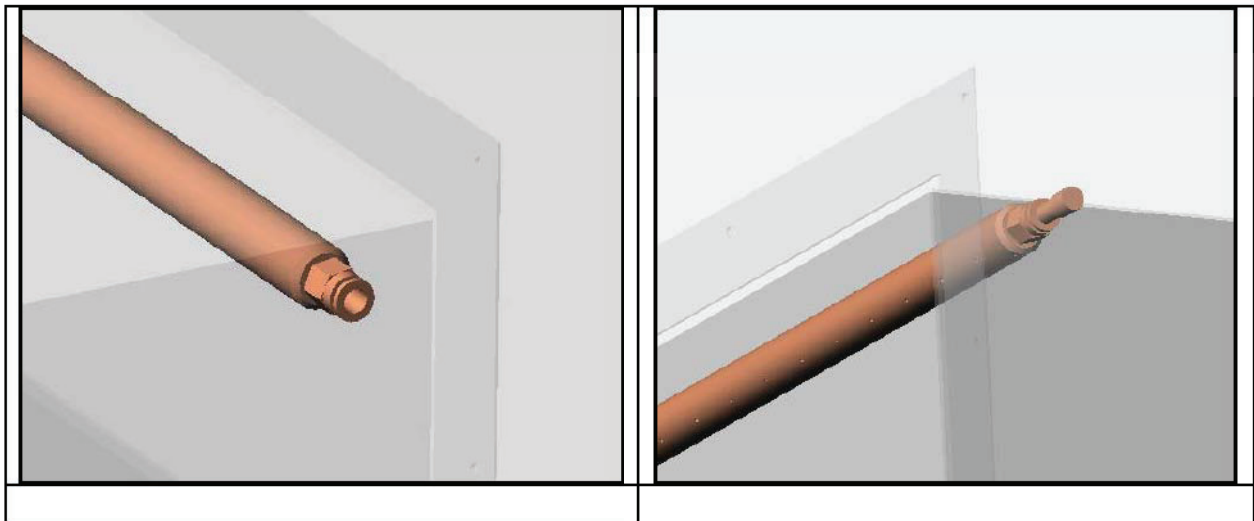
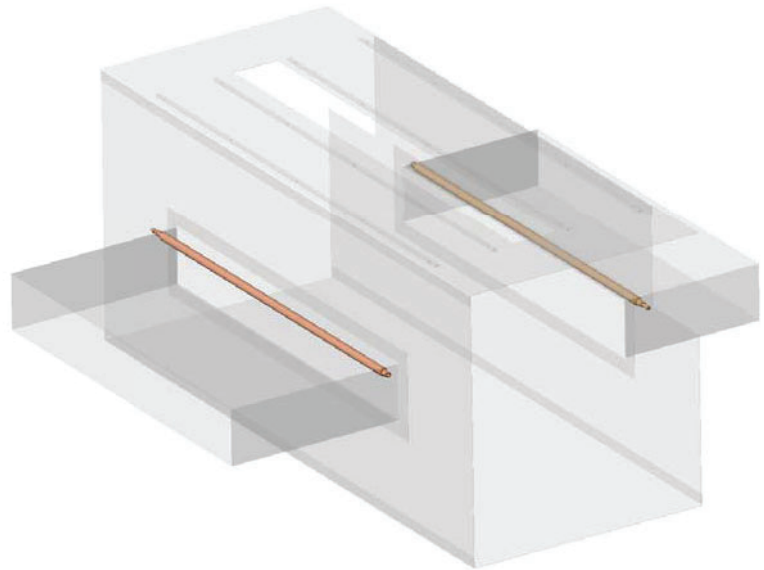
Solvent with a flashpoint below 21°C must not be used on this machine



It's not allowed to spray solvent

Air knives

In order to avoid that contaminated air is escaping into the environment, they are an air knife at the inlet and at the outlet of the machine. The air pressure has to be adjusted so that no lacquer moisture can leave the machine. Neither at the inlet nor at the outlet. The pressure gauge is placed in the pneumatic control box on top of the machine. (see pneumatic control)

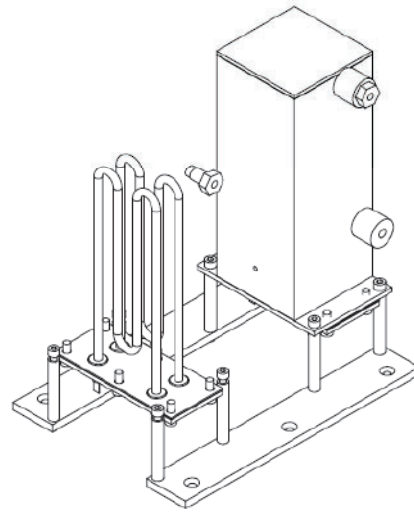
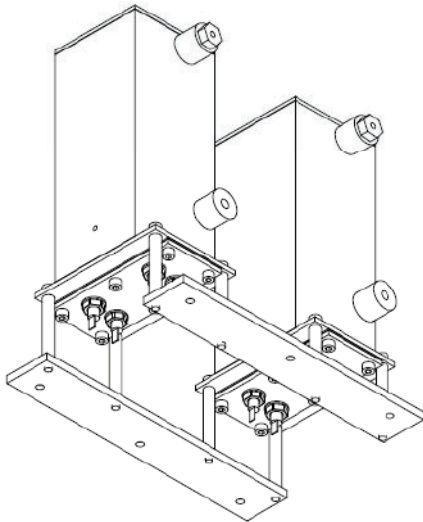


Basic setting of the air knives 45°

Air pressure about 0.5 bar

3. Heaters

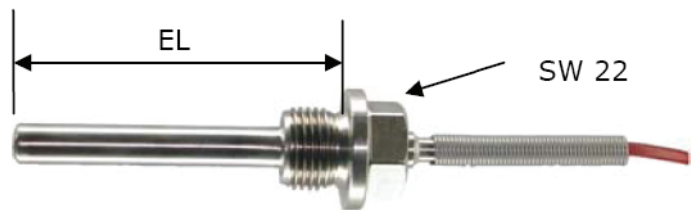
Two heating elements of 1kW capacity each are heating the spraying air and the horn air.



Heater of the spraying air with temperature probe, excess temperature control and safety thermostats

Temperature probe

2 Temperature probes PT 100 are placed in air heaters, controlling the temperature of the spray air and the horn air. The actual temperatures can be read off on the touchscreen. The temperature developing can be observed on the touchscreen under „curves“



Safety thermostats

The safety thermostat consists in a temperature probe and a mechanical switch. The probe is placed close to the heating element and the mechanical switch is sitting near by the heater housing on top of the machine.

The maximum trigger temperature can be set with a screwdriver by rotating the disk. The maximum allowed trigger temperature should not be set higher than 200°C.

The activation of the safety thermostate causes an immediate switch off of the heating elements and a corresponding alarm appears on the touchscreen. A possible breakdown of a PC 100 is checked by the PLC.



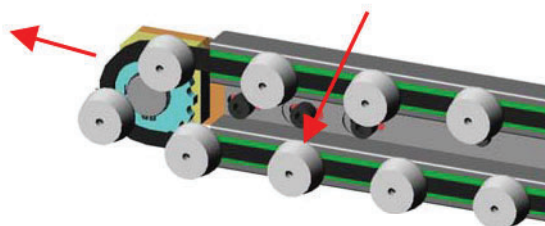
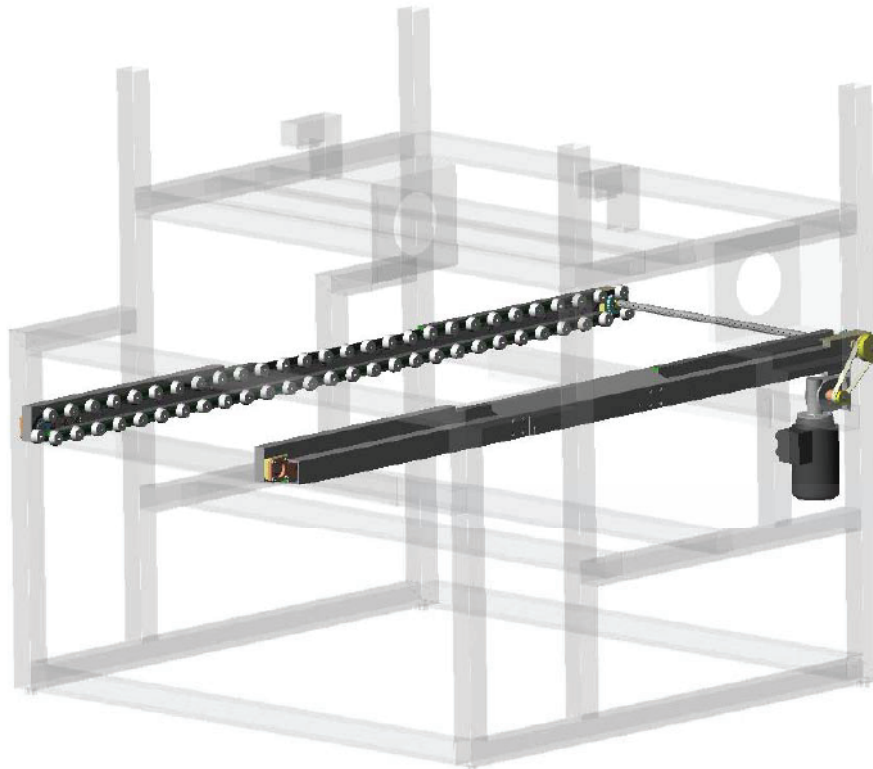
4. Transport System

The panels are transported through the machine on plastic supports fixed on the transport chain. This supports are only plugged to the chain and they can easily and without tool be removed for cleaning

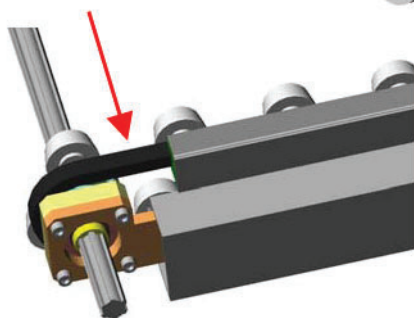
The tension device to span the chain is placed on the inlet side of the machine.

The driving motor for the transport chain is placed on outlet side of the machine, outside the casing.

The transport speed is electronically set by the control system on the touchscreen



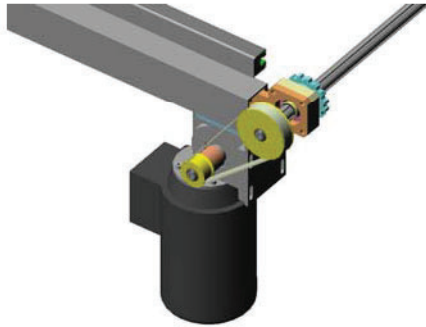
Tension device to span the chain



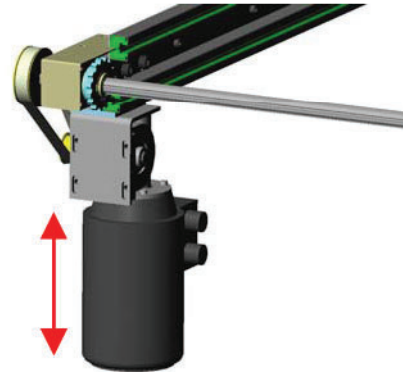
On the outlet side are gaps to enable the opening of the master links

Chain Drive

On the outlet side is the drive motor for the transport chain.
The transport speed is electronically set by the control system on the touchscreen.

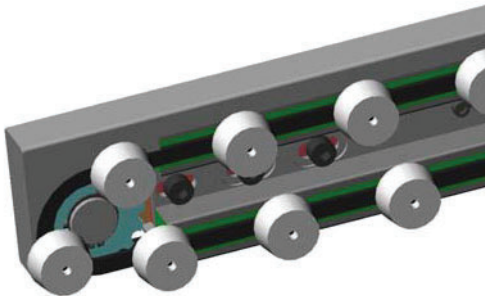


Drive motor of the transport chain

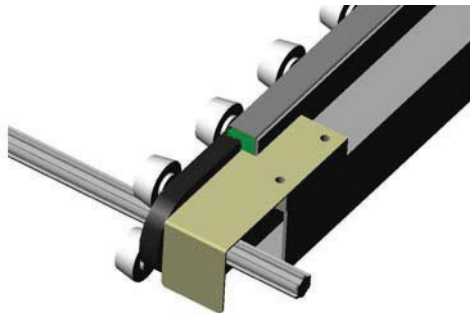


Tension device for the toothed drive belt of the chain drive

The transport chains are both at the inlet side and at the outlet side protected against access. The protecting sheet are for the protection of the operating personnel and should not be removed. The dismantling is only allowed for maintenance works and only by authorized personnel.



Protecting sheet inlet

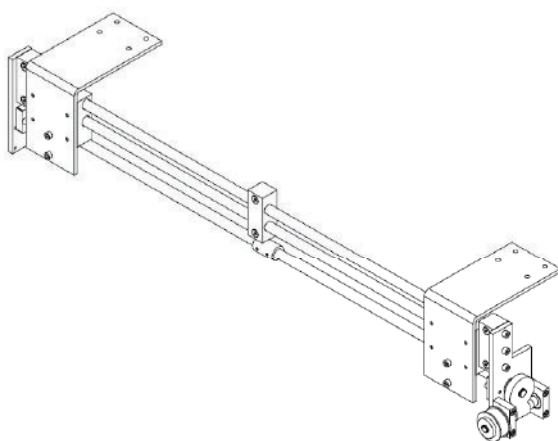
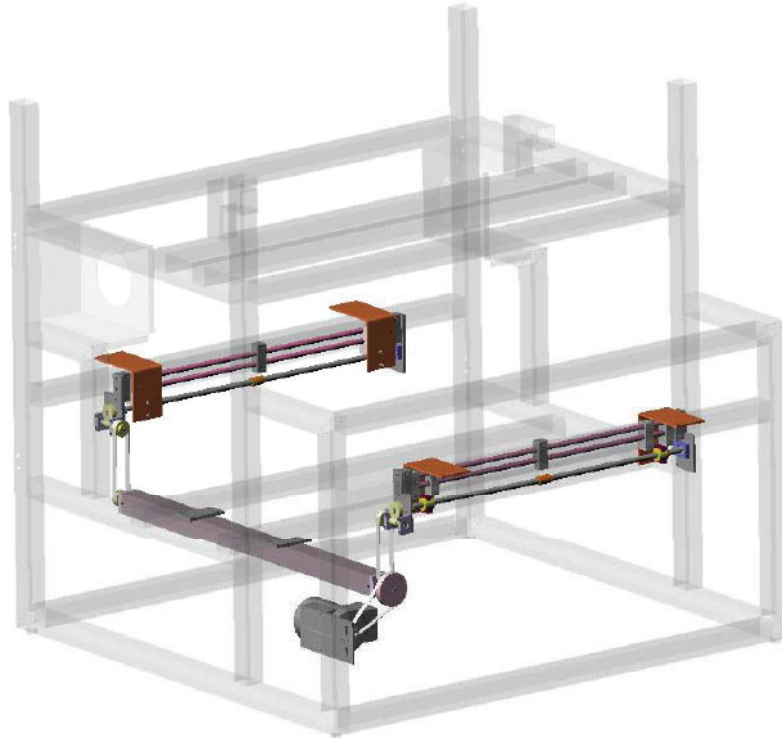


Protecting sheet outlet

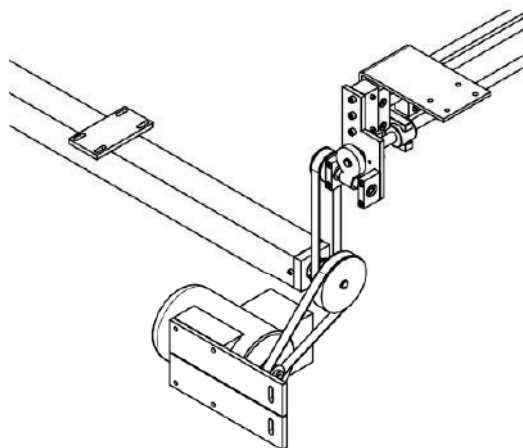
5. Width adjustment system

With this equipment panels with a width of minimum 300 mm and a maximum of 760 mm can be processed. The width of the transport system has to be adjusted according to the width of the panels which have to be processed. The width adjustment is electronically set by the control system on the touchscreen.

The width adjustment system is equipped with a position sensor placed on the outlet side of the machine. This absolute position sensor keeps the actual settings even when the machine is turned off.



Mechanics of the width adjustment



Drive width adjustment

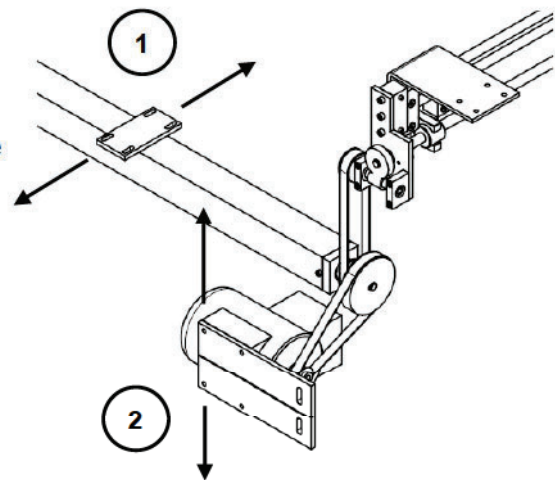


Position sensor

Belt tension

Two steps to set the tension of the toothed drive belt:

1. Move the connecting shaft crosswise to the processing axis. Both of the toothed drive belts have to be tightened equally.
2. Move the drive unit up/downwards to tighten the drive belt.



Verletzungsgefahr bei laufender Anlage:

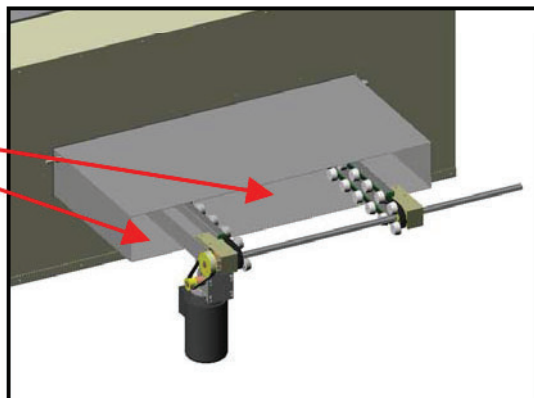
→ Do not touch the belts of the drive unit. While processing the machine automatically adjusts differences from the set value.



Grease the spindles weekly.



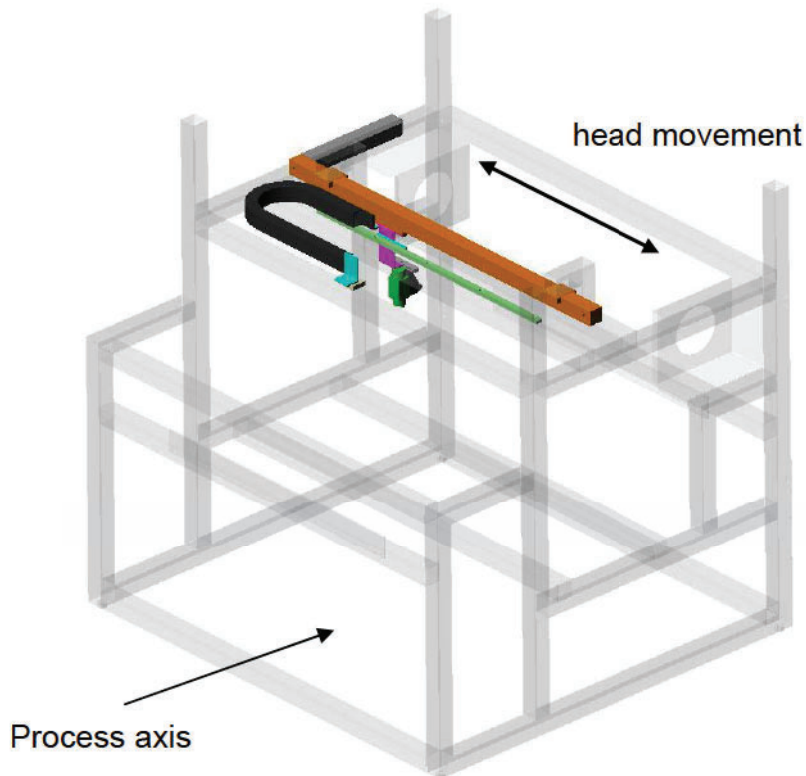
Don't deposit any objects in the cabin area.



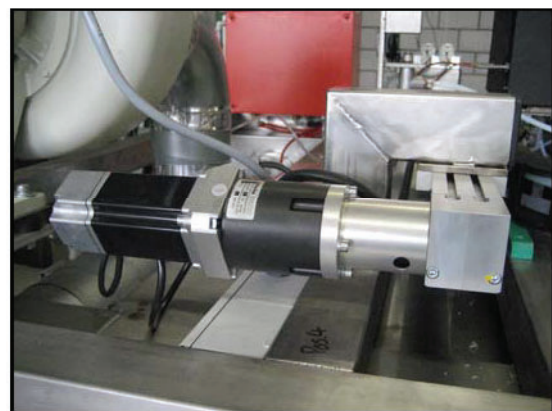
6. Sprayhead

The sprayhead is the center of the machine, where air pipes and lacquer pipes fit together in the cable drag chain. The oscillation of the sprayhead is carried out by a linear drive powered by servodrive.

The sprayhead oscillates crossline to the process axis. There's always the same movement between the end positions. The width to be sprayed conforms to the panel width, which is set in the control system.

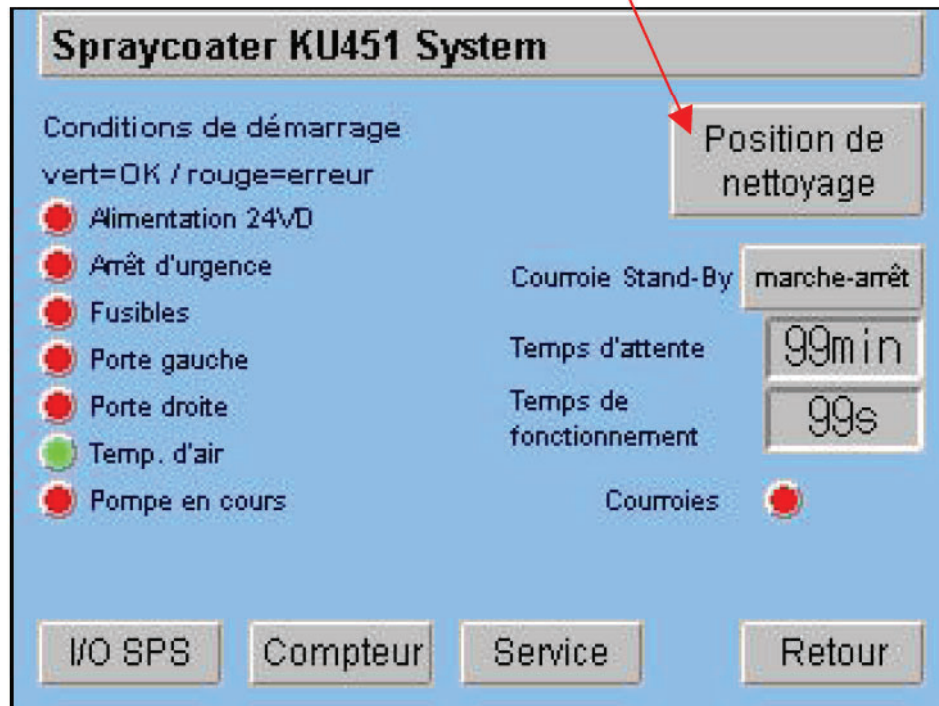


Linear drive



Servodrive of the linear drive

For cleaning the nozzle the sprayhead can be placed in cleaning position on right hand side of the oscillation track: On the touchscreen, window „system“ press „Cleaning position“



Key sequence:

In the start picture press

- „Machine on/off“
- „System“

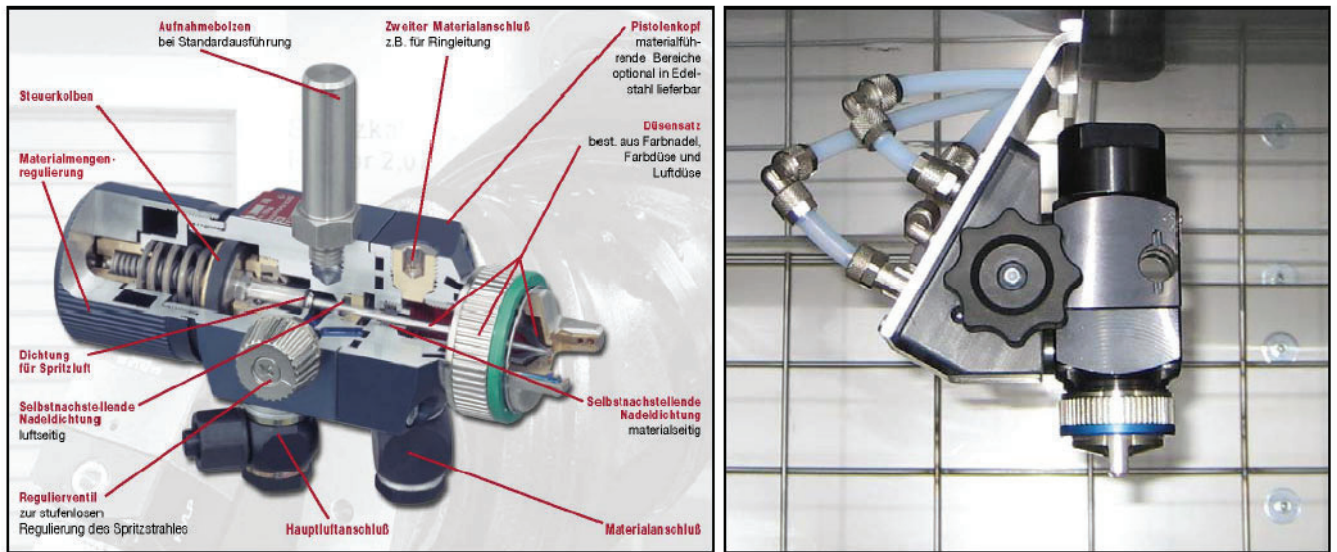
in the picture „System“ press

- „Cleaning position“

After disassembling, cleaning and mounting of the nozzle, the sprayhead has to be brought to the center of the oscillation track.



If the sprayhead carriage once hits one of the limit switches the movement will be interrupted and an error message will be set. To reactivate please turn the machine off and move the carriage manually off that position (always move to the middle). After that turn the machine on and initialize again.



4. Changing the nozzle set

a) Make the whole system depressurized. Remove material flow control knob and end cap with 24 mm openend wrench, remove springs.

b) Remove the needle (a bit difficult due to the 5 sealings, if necessary use flat tongs with care).

In case of new devices proceed in the same way and take into account that the sealings stop even more the pulling out.

c) Remove air cap by hand (do not use tongs or vise grips)

d) Remove paint nozzle with the help of a universal spanner. When assembling the new nozzle set proceed in reverse order. Mount always the paint nozzle before the paint needle.
Warning:

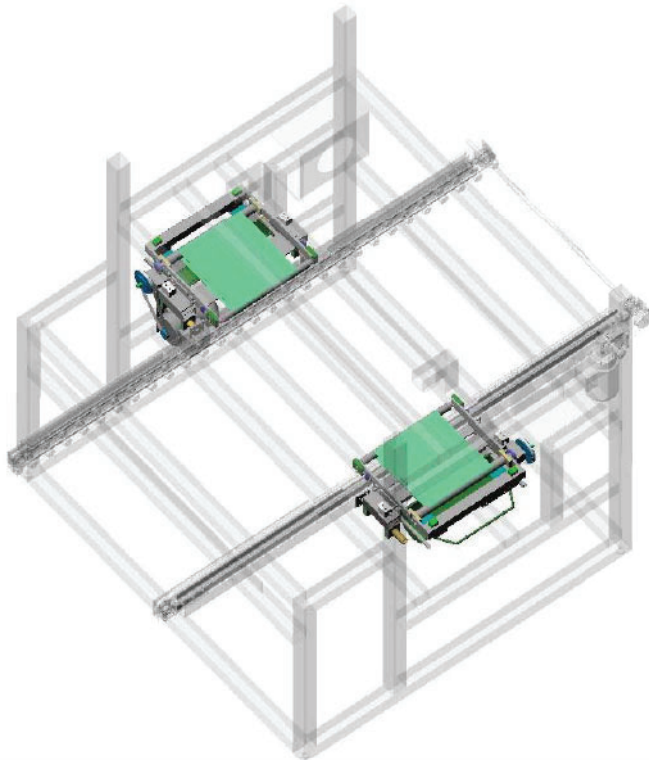


Do never screw a paint nozzle on a paint needle as long as the paint needle presses against the paint needle seat. Unscrew air and paint nozzle and remove the seal retainer using a socket wrench.

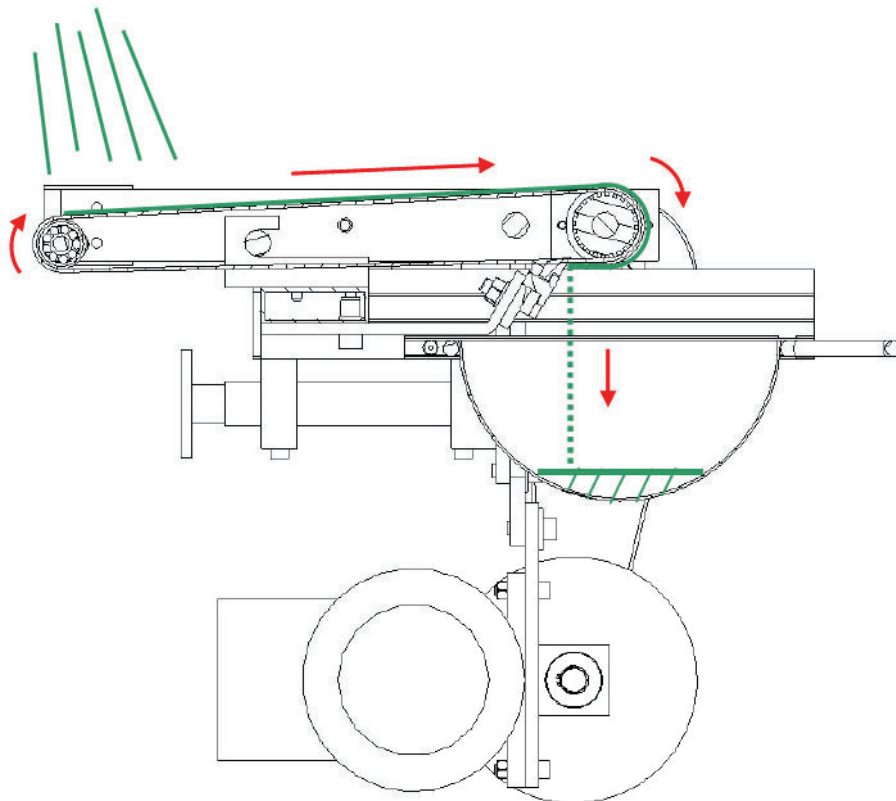


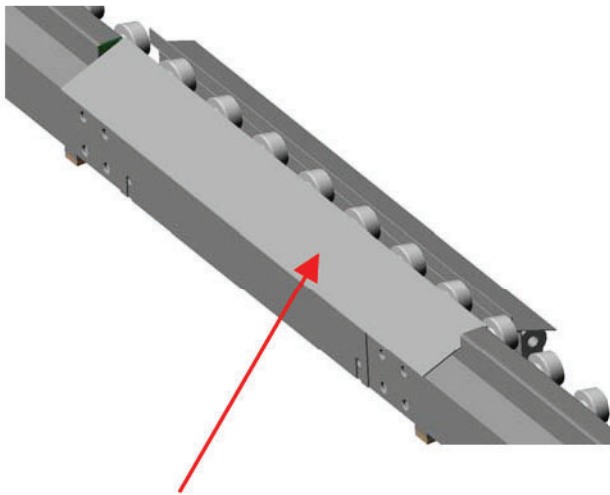
For more information about the sprayhead, please see the following manual of the manufacturer.

7. Lacquer recycling system, squeegee, collecting tray

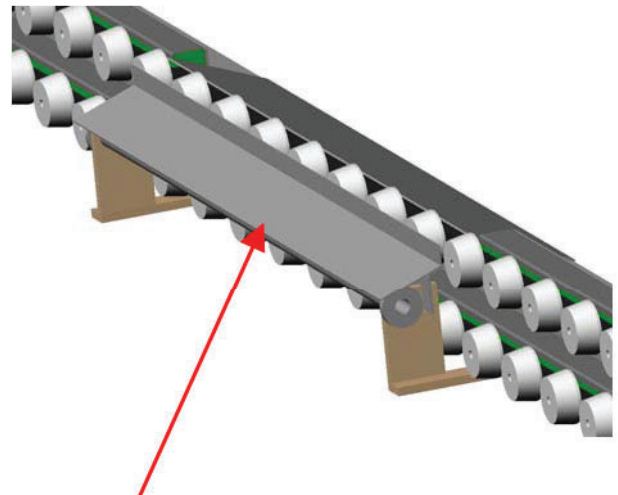


In order to minimize the lacquer losts by overspray, the machine is equipped with a patented recovering system.:
On both sides of the transport system in the region where the overspray occurs, are collecting belts placed. The belts are rotating during the spraying period and so they transport the the lacquer to their underside where it is peeled away by the squeegee and directed into the collecting tray.

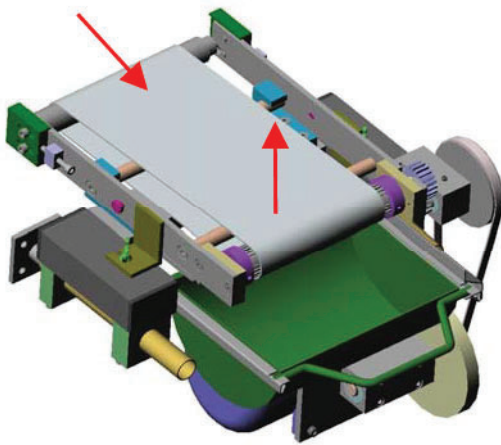




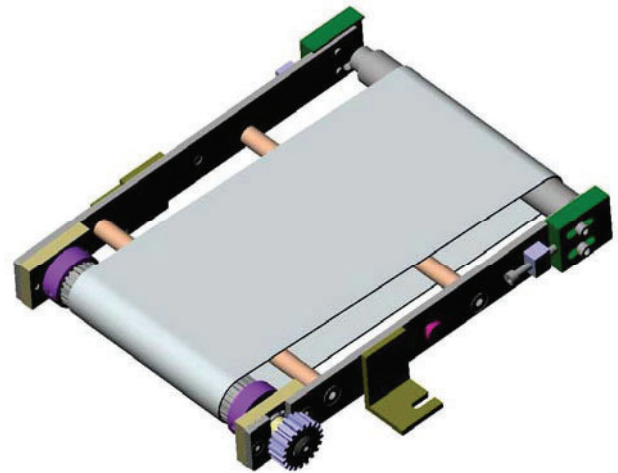
Exterior chain protecting sheet



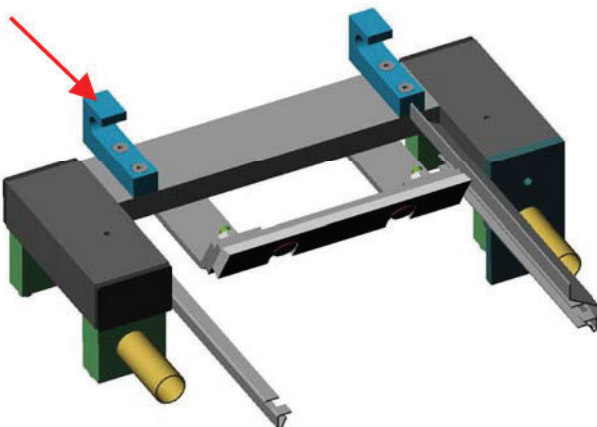
Interior chain protecting sheet



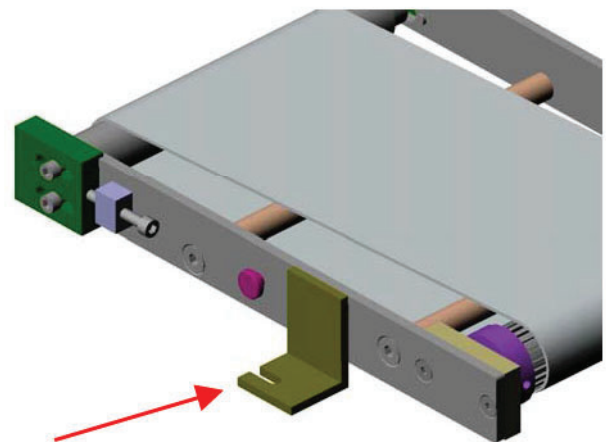
Removing the collecting belts:
Pull toward you, lift up and remove



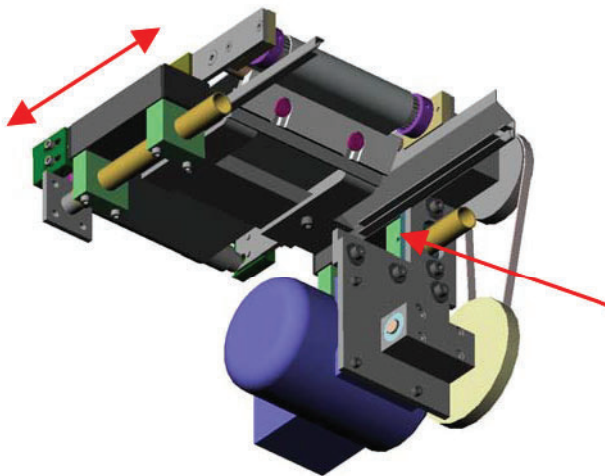
The collecting belts are one unit and can easily and without tools be removed for cleaning.



The collecting belt is to be hooked into the socket.

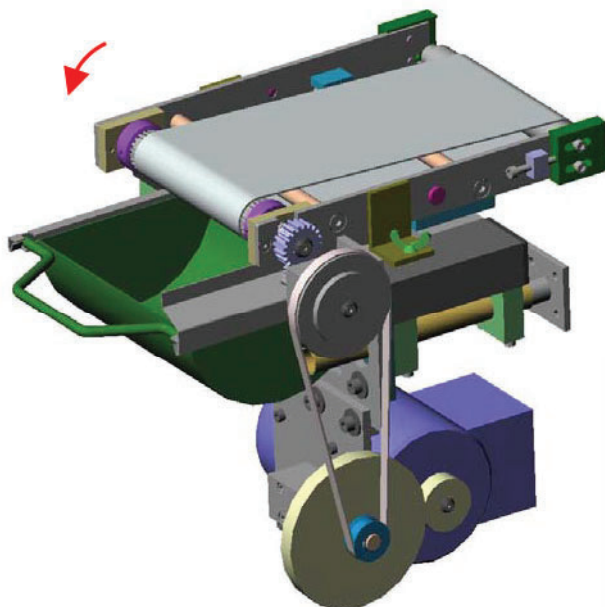


Bracket on the collecting belt.



To adjust the lacquer free edges on the panels please move the whole recycling system across the processing axis.

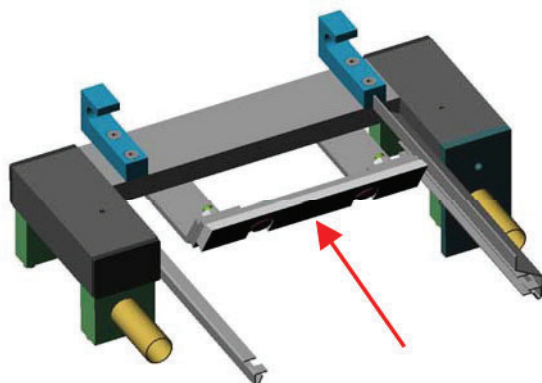
Remove the collecting tray and unlock the screws in the aluminum carriages to set the desired position.



The whole lacquer recycling system is placed on the inner side of the spray cabin. This is an explosion proof zone. Therefore the drives are explosion protected.



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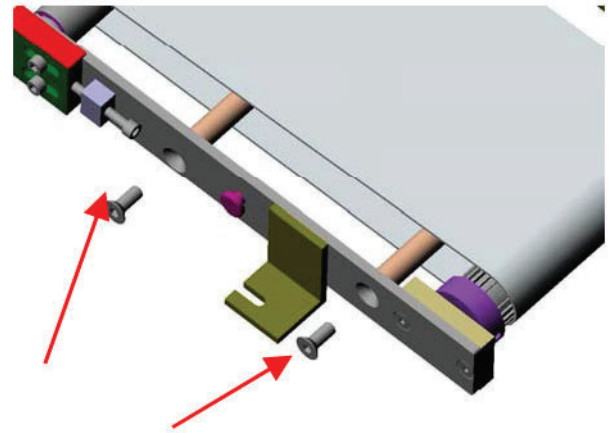
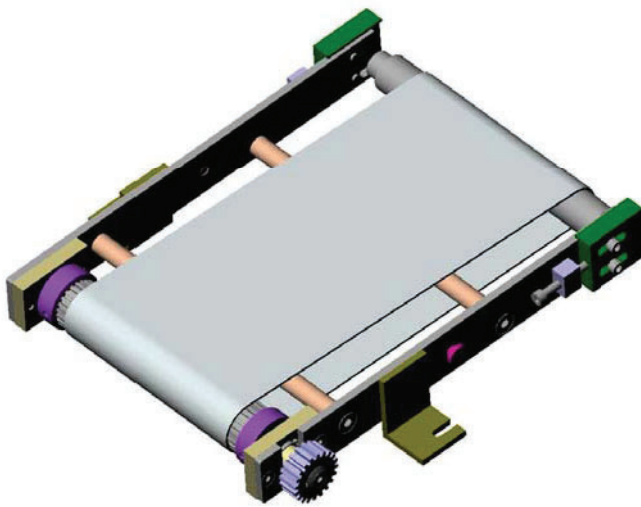
The squeegee is placed on the bottom side of the belt unit. To facilitate the cleaning, the squeegee can be dismantled by removing the screws.



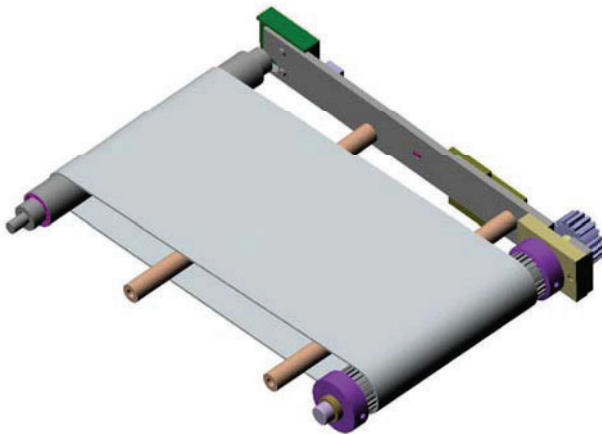
The lacquer is peeled away by the squeegee and falls into the collecting tray.

Replacement of the conveyor belt

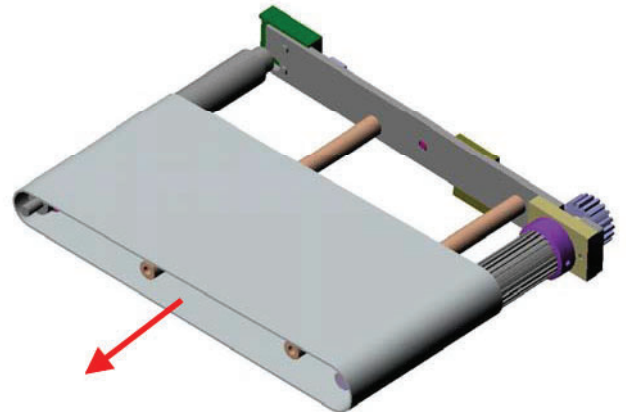
Before replacing the conveyor belt be sure that the unit is cleaned.



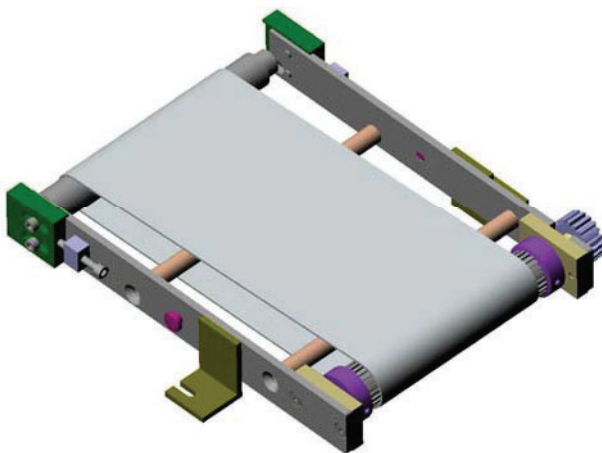
Remove the screws of the frame



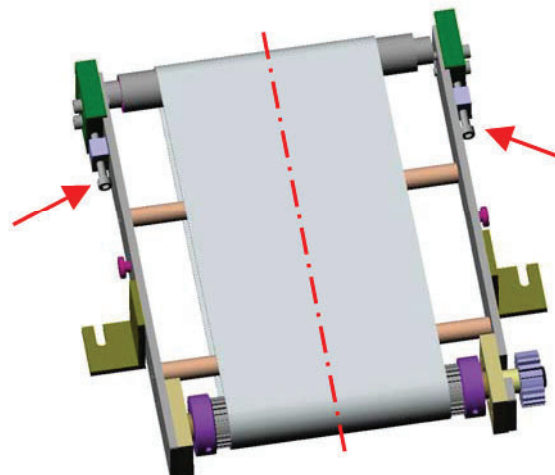
Remove the the frame



Remove the belt



Replace the belt and reassemble the unit



Adjust the clamp screws on both sides to make the belt moving in the centre of the unit. (best performance while running in the machine)

Setting range of the Parameters

The values of the different parameters has to be determined and optimized together with the supplier of the lacquer.

Parameter	Min.	Max.	Unit	Description
viscosity	0	500	-	The lower the value the thicker the lacquer. A thin lacquer leads to a better surface because the single drops better flows together. But the edge coverage is worse because the lacquer has more flow off the edges.
lacquer pressure	0	2000	mbar	The pressure of the lacquer sets the value of lacquer on the board. The specified setpoint of the pressure is regulated by the rotation speed of the pump.
atomisation air pressure	1800	5000	mbar	The higher the pressure of the atomisation air the finer is the atomisation of the lacquer drops and therefore the more equal is the spray surface. A higher pressure of the atomisation air leads to more dust and more pollution inside the cabine.
shaping air pressure	1800	5000	mbar	The form of the spray jet is set by the pressure of the shaping air. A lower pressure produces a spray jet like a spot. A higher pressure leads to a long drawn spray jet. The pressure of the shaping air should be set equal to the atomisation air pressure.
air temperature	20	140	°C	The air temperature influences the viscosity of the lacquer. The higher the temperature of the shaping and atomisation air the thinner is the lacquer while being atomised, and the smaller is the size of the lacquer drops. A higher air temperature causes the lacquer temperature to rise. This leads to partial volatilisation of the solvent.
hysteresis	5	20	°C	Tolerance range where the temperature can vary before automatically being reset.
Overspray	0	150	mm	The range to be sprayed is depending on the board size and on the programmed overspray value. Example: a board with 450mm width and an overspray value of 60mm result in a range to be sprayed of $450+2*60=570$ mm. On both sides 60mm will be spayed "over" onto the lacquer recycling belt. The overspay can also be set to the inside of the board. This results in following range to be sprayed: $450-2*60=330$ mm.
speed of transport	0	160	cm/min	The speed of the transport is closely depending on the speed of the sprayhead. A too fast transport speed results in a zigzag spraying pattern on the panels.
speed of spray head	0	160	cm/s	
rest period of head	0	10000	ms	The programmable delay at the reversal point of the sprayhead carriage.
unsprayed lenght	1	80	cm	The distance not to be sprayed on the dummy boards



The ideal parameter setting has to be established with the lacquer manufacturer.