

Operating Manual

S3 Digital Cutter



Keep it in a safe place for future use!

Original operating manual

Software/Firmware version: FW1.77-1

Creation date: 02-2023

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1 Introduction

**Dear customer,**

With your decision to purchase our product you are participating in the worldwide success of Zünd cutter systems.

The modular design of our systems provides the following benefits, among others things:

- A system solution that meets your individual requirements in terms of speed and quality.
- The availability of the most up-to-date technology thanks to continuous development.

Our approach

Constant and intensive cooperation with experienced users is essential for developing innovative and practical solutions. We are, therefore, grateful for any comments or suggestions on how we can improve.

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1.1 Using the operating manual

The supplied operating manual is intended to enable you to operate the machine safely, perform routine maintenance and use the machine optimally in every way.

To do this, you need to be able to find what you need in the documentation.

Scope of the operating manual



Volume 1 - Operating instructions

This volume contains information on engineering, commissioning, operation and maintenance of the machine.



Volume 2 - Service manual

This volume contains information on the design of the machine and on servicing by authorized service technicians. The service manual is not included in the scope of delivery of the machine.



Spare parts catalog

The spare parts catalog is not included in the scope of delivery of the machine.

Structure of the operating instructions

The operating instructions consist of separate sections, which are numbered consecutively and arranged according to the ring binder tabs.

The table of contents provides information on the structure of the individual sections.

Indication of optional accessories

There are many optional accessories available for the machine. Descriptions of optional additional equipment are labeled in the operating manual with the wording **(optional)**.

Safekeeping of the documentation

Always keep Volume 1 of the "User manual" close at hand in the vicinity of the workstation.

Current status of the documentation

In order to ensure that the operating manual always remains complete and up to date, the following must be observed:

- Do not remove individual documents.
- Request copies of missing or illegible pages from the manufacturer, or download them from the Zünd homepage and print them out.
- If any new documentation is provided as a result of conversions, add it immediately.
- Replace changed documents and destroy the old version.
- If the documentation exists in more than one language, ensure that all languages are kept up to date.

1.2 Points to note when reading this operating manual

Text references

Chapter headings are numbered consecutively in the chapters, with the first figure corresponding to the chapter number. Where reference is made to sections outside the current chapter, note the first figure and turn to the corresponding chapter, which contains the cited section. See chapter 2.4 Cutter; overview, for example, leads to chapter 2 Product description, which contains section 4 Cutter overview.

Block diagrams and simplified representation

Note that all representations are provided for general information and do not necessarily correspond to the latest version of the machine.

Dimensional information

Dimensional information is listed in the SI/US units, depending on the installation site.

1.3 Publishing details

Designation

Operating instructions for S3 series cutters.

Layout, illustration, and print

Zünd Systemtechnik AG - Technical Communications Department

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2 Product description

This chapter contains information on the following:

- Representation conventions in the operating manual
- Usage possibilities of the machine
- Structure of the main components
- Important technical data
- General technical description of the machine

2.1 Important information about the product



Tip:

"Tip" refers to useful information which enhances the usability and prolongs the service life of the machine or makes the work process significantly easier.



Tip:

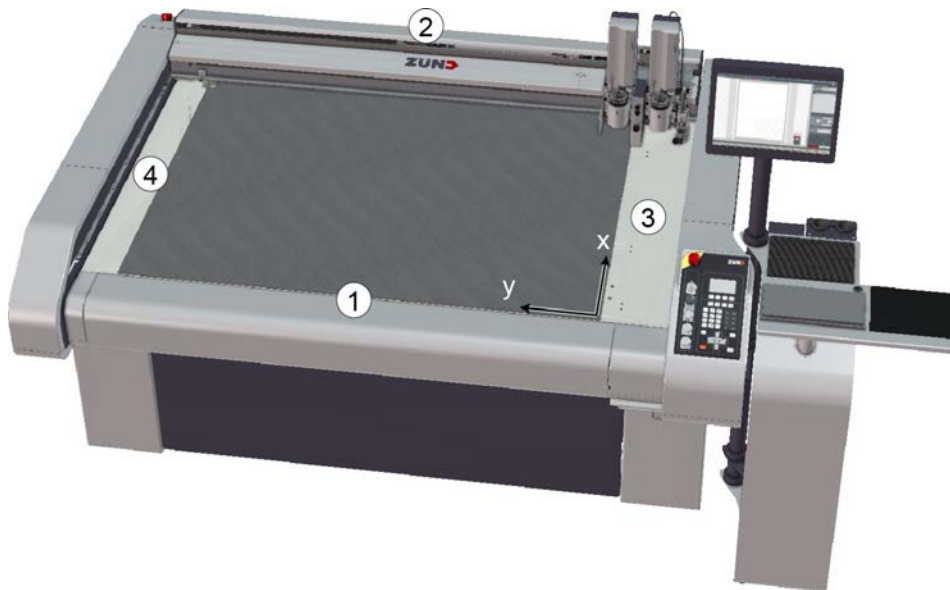
With tips combined with the sheet we give you usage tips and useful information which can improve the energy efficiency of the machine or optimize its environmental effects.

Important:

Usage tips and important machine operating information are labeled with **Important**.

2.2 Orientation

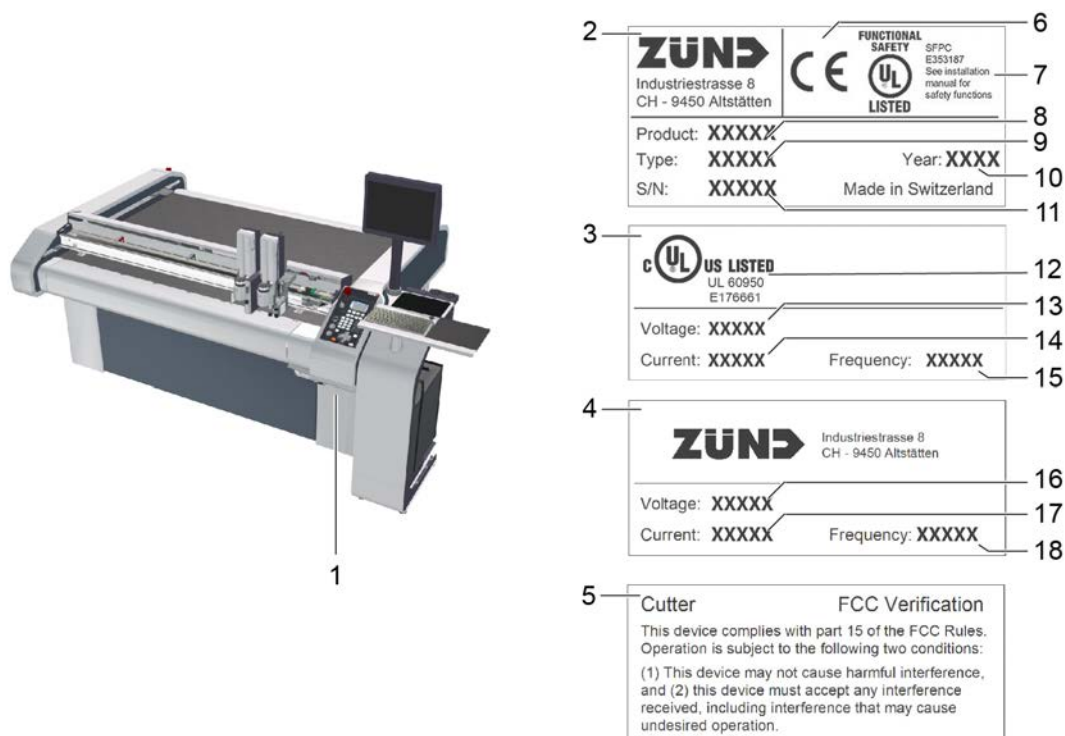
Directions such as "right, left" or "front, back" relate to the operator's view of the machine during operation.



- 1 front
- 2 rear
- 3 right
- 4 left
- X X-axis
- Y Y axis

2.3 Product identification

2.3.1 Rating plate



1	Position of the signs	10	Year of manufacture
2	Rating plate	11	Serial number
3	Additional UL sign	12	UL mark of conformity
4	Additional connection values	13	Nominal voltage
5	Additional FCC sign	14	Rated current
6	CE mark of conformity	15	Frequency
7	UL functional safety	16	Nominal voltage
8	Product name	17	Current consumption
9	Type designation	18	Frequency

2.4 Intended use

The cutter system can be used for the following purposes:

- As an output station for CAD/CAM data.
- For processing and labeling of materials.

The intended use and the usage restrictions are also dependent on the available tool and material transport system, which are described in the "Tools", "Modules" and "Material handling" chapters.

2.5 Cutter overview



- 1 Air supply to maintenance units
- 2 Beam
- 3 Tool/module power supply
- 4 Extractor
- 5 Workstation
- 6 Control panel with optional workstation
- 7 Vacuum pump
- 8 Working area

2.6 Modules, tools

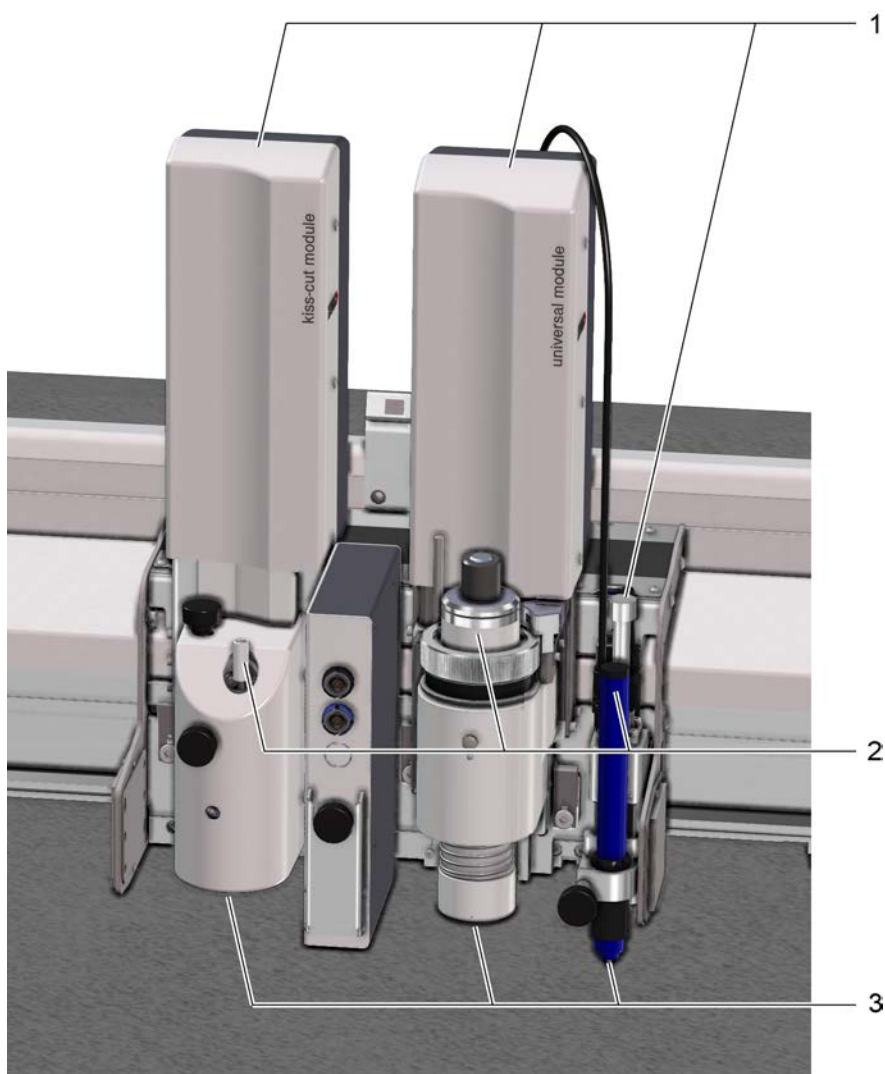
Zünd cutters are highly specialized and can be easily converted to process other materials through the use of modules and tools.

Two modules can be attached to slots 1 and 2 on the module carriage as standard. Either an electrically or pneumatically driven marking module can be installed in slot 3 (MAM-SP, MAM-SE).



Tip:

You can find detailed information in section [Handling modules/tools](#) on page 88 as well as in the individual operating manuals of your modules and tools.



- 1 Module (e.g., KCM-S, UM-S)
- 2 Tool (e.g. CT, UCT, EOT, POT)
- 3 Tool insert: router, blade, pen

2.6.1 Universal applications

Universal modules - UM-S



Universally applicable carrier module for a wide range of tools.

Tools for use in the UM



Electric Oscillating Tool - EOT

Cutting tool with high oscillation frequency for soft and medium hard materials.



Electric Oscillating Tool - EOT-250

Robust tool with high-performance electric drive for processing thick cardboard and leather materials.



Pneumatic Oscillating Tool - POT

Powerful cutting tool with large oscillation stroke for hard and tough materials of up to 50 mm thickness.



Driven Rotary Tool - DRT

Tool for technically demanding textiles and textile materials. The powered rotary knife enables a very high processing speed.



Universal Cutting Tool - UCT

Universally usable cutting tool for materials of up to 5 mm thickness.



Scoring Cutting Tool - SCT

Combination tool for scoring and cutting cardboard and coating blankets of up to 5 mm material thickness.



V-Cut Tool - VCT

Tool with five different cutting angles. Creation of complex 3D constructions from high expansion foam or sandwich boards.



Passepartout Tool - PPT

Exact 45° oblique cuts in constantly high quality.



Perforating Tool - PTT1

Ideal tool for creating precise perforations in corrugated cardboard, solid board, polypropylene, and foil.



Kiss Cutting Tool - KCT

Kiss-Cutting tool with adjustable pressing pressure for the processing of numerous vinyl materials.



Universal Routing Tool - URT

Cost-effective routing and engraving tool.



Creasing Tools - CTT1/2

Creasing of various types of materials. The pressing pressure is separately adjustable laterally and longitudinally along the shaft.



Universal Drawing Tool - UDT

Drawing tool for the use of standard commercial leads in various line thicknesses.



Raster Braille Tool - RBT

Efficient procedure for the creation of tactile Braille markings (for the blind).

2.6.2 Routing, engraving:

Router modules - RM-S



Universally usable routing system, fitted with a powerful high frequency spindle.

- Routing depth up to 25 mm
- Effective dust extraction, actively air-cooled
- Surface compensation for precise depth setting
- Optional Minimal Quantity Lubrication- MQL for processing soft aluminum alloys
- 1 kW high-frequency spindle for very high processing speeds

Tools for use in the RM-S



HF motor spindle 4040 DC-SZ

Motor spindle with 1000 W and manual roll pin.

2.6.3 Punching, perforating



Punch and Pricking Module - PPM-S: Combined high-performance tool for perforating and punching leather, rubber and textile materials with up to 8 holes per second. A punching spike is integrated.



Punch and Pricking Module - PPM-S: High-performance tool for perforating leather, rubber and textile materials with up to 8 holes per second. A marking tool is integrated.

2.6.4 Kiss-cutting

Kiss-cut module - KCM-S



KCM-S: This module cuts films with the highest precision and processing speed without damaging the carrier material.

2.6.5 Drawing, marking, labeling

Marker modules - MAM



Marking and labeling of various types of materials. Use of standard commercial leads.

- **MAM-SE:** 1 drawing tool, electric
- **MAM-SP:** 1 drawing tool, pneumatic
- **MAM-SPS:** 1 drawing tool, pneumatic
- **MAM-SPD:** 2 drawing tool, pneumatic

2.7 Material handling

Cutter with static work surface



Loading and removal of the processing material on the working surface of the cutter. The working surface is protected against damage using a cutting board.

Cutter with material transport



The material transport is used to pull the processing materials onto the work surface. The conveyor belt is used as a cutting base and conveyor belt at the same time.

During processing, the material to be processed is fixed in place using a vacuum. After cutting, the beam moves backwards. The conveyor clamping elements fix the conveyor belt and the feeding clamps are pressed onto the material to be pushed forward. The beam tightens the conveyor belt to the set position.

The shape of the feeding clamps varies depending on the material to be processed. An auxiliary drive is used for larger tables or for transporting heavier processing materials.



Cutter extensions allow streamlined working. The material supply/removal is carried out while the cutter is completing the jobs. Cutter extensions are available in different sizes.

2.7.1 Collection tray



The collection tray is a practical device with which the cutting waste and cut parts are collected. It ensures a clean working environment. For emptying, the tray can be removed from the cutter in just a few steps.

2.8 Options

2.8.1 Laser pointer



The laser pointer is used as an aid for the precise definition of the reference point. It also serves for the connection of electrically driven tools.

2.8.2 ICC camera



The ICC camera allows perfect registration in which the exact position of printed material on the processing surface is determined.

The integrated laser pointer is used as an aid for the precise determination of the reference point. Electrically driven tools can also be connected to the camera.

2.9 Accessories box

The accessories box is delivered with the cutter. The accessories box contains the tools and operating and auxiliary materials needed for maintaining the cutter. The contents are provided appropriately for the cutter.

Contents (sample)

Accessories	Quantity	Task	Conveyor	Static	PU
Allen screwdriver 4 x 170 mm	1 pc.	Assembling/ disassembling modules	X	X	X
Torx screwdriver TX10	1 pc.	Assembling/ disassembling covers	X	X	X
Special guide rail oil	25 ml	Oil for the X/Y axis guide rails, carriage and bearings	X	X	X
Lubrication set, X axis guide rails	1 pc.	Oil for the X/Y axis guide rails, carriage and bearings	X	X	X
Staple gun	1 pc.	Replacing the conveyor belt	X		
Dosing gun KPM 250 ECON	1 pc.	Replacing the conveyor belt	X		
19 mm tape, double- sided	1 pc.	Fixing the cutting board		X	
Teflon grease	20 ml	Service	X	X	X
Soldering fluid brush	1 pc.	Service	X	X	X
Glass tube safety guards (various)	5 pcs.	Service	X	X	X

2.10 Technical description

Zünd high performance cutters enable efficient and precise processing of the most varied of materials. With the modular tool and material handling system, you can adapt your machine to your individual requirements. Define the production requirements and put together your tailor-made cutter configuration from the Zünd kit concept.

2.10.1 Base machine

Table design

The cutter consists of a base frame and a beam. Whereas the base frame is produced in the form of a stable welded structure, the beam consists of a lightweight, torsionally rigid aluminum profile. The cutter is mounted on vibration-dampening machine feet.

Working area / vacuum plate

The working area is made of stable plastic. The vacuum zones are arranged under the working area and are controlled using a slider. The vacuum is built up using a powerful vacuum generator. The vacuum is used for holding down and tightening the material to be processed.

Electronics unit / power box

The power box is housed in the front right-hand side of the cutter and is only accessible via a removable cover. The power box contains the power supply of the complete cutter and is activated/deactivated with the main switch. The connection of the individual consumers takes place using software control, if required.

The electronics unit is arranged behind the power box. The electronics unit can only be accessed using a special tool. The cutter control is housed in the electronics unit.

Pneumatics

The air pressure for the respective consumers is adjusted via a maintenance unit. The maintenance unit is accessible via service doors for adjusting settings and carrying out maintenance work.

2.10.2 Movement system

The S3 series has four electronically driven axes:

Axis	Function	Movement system
X	Movement of the beam	Driven via toothed belt
	Material transport, material transport extension	Feed clamping elements, feeding clamps
Y	Movement of the module carriage	Driven via toothed belt
Z	Height adjustment of the module	Example UM-S
T	Rotary movement of the module	Example UM-S

X axis - beam

The bar is driven via a toothed belt and a powerful electric motor. The design ensures that it works without play and it also minimizes wear on the drive system. The beam is supplied with control

signals and compressed air via an energy chain. All drive parts are protected against direct access or contamination using covers.

X axis - material transport

Material transport takes place via conveyor clamp elements and feeding clamps on the bar. Feed takes place via the bar movement. The conveyor belt is gripped by the conveyor clamp elements and the processing material is secured against displacement using the feeding clamps.

Y axis - module carriage

The module carriage is driven by a motor via a toothed belt / gear mechanism. The design ensures that it works without play and it also minimizes wear on the drive system. The module carriage is supplied with control signals and compressed air via an energy chain. All drive parts are protected against direct access/contamination using covers.

Z axis - height adjustment of the module

Machine-controlled setting of the processing height (e.g. UM-S).

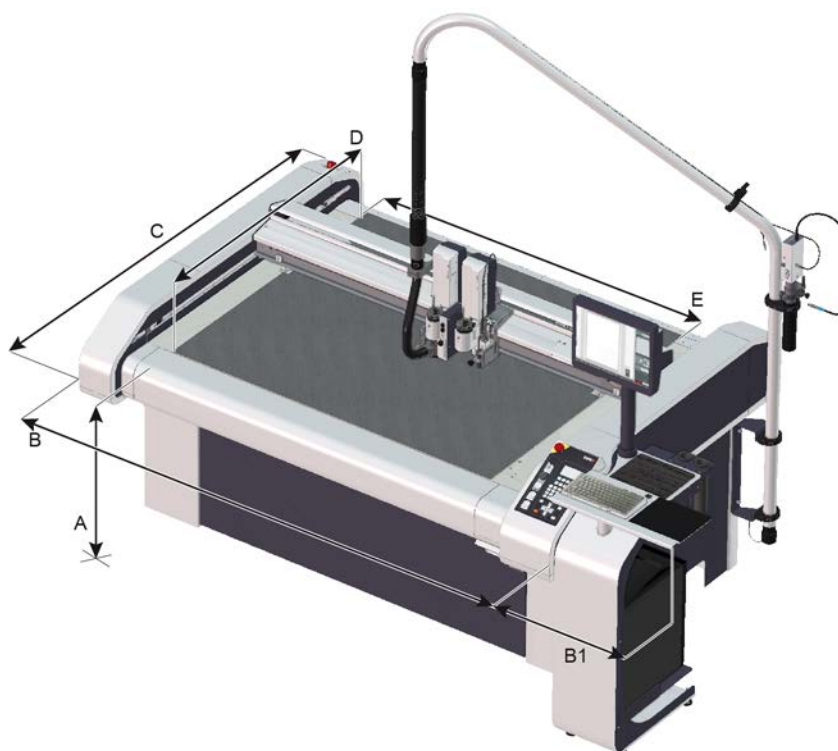
T axis - rotary movement of the module

Modules with integrated T axis (e.g. UM-S) align the tool insert to the cutting path.

2.11 Technical data

2.11.1 Dimensions

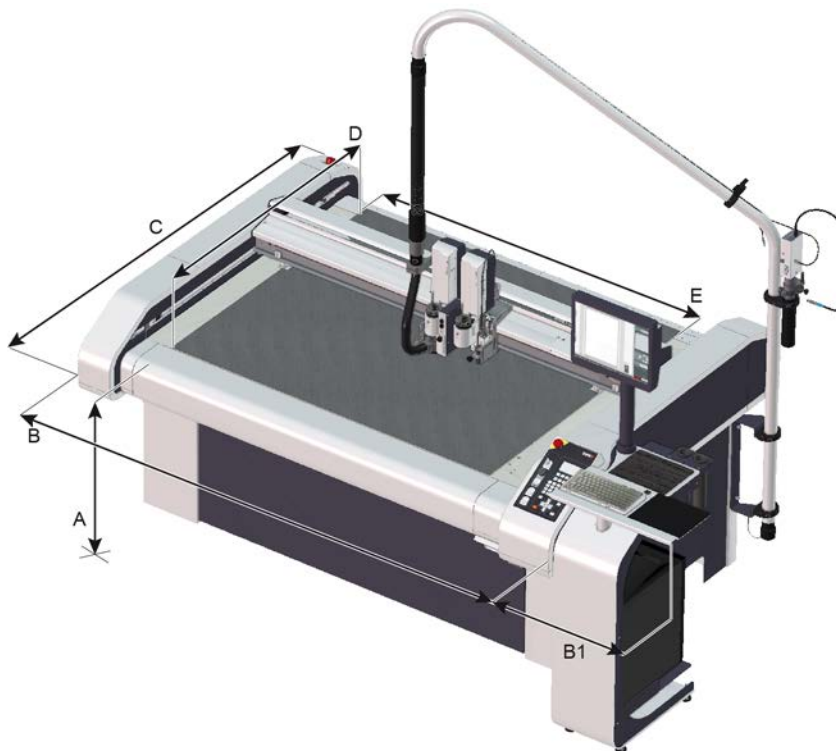
2.11.1.1 Base cutter (mm)



The effectively usable working surface (D x E) depends on the tool or module.

Type (mm)	A	B	B1	C	D	E
M-800	830	2086	520	1542	830	1330
M-1200				1942	1230	
M-1600				2342	1630	
L-1200		2556		1942	1230	1800
L-1600				2342	1630	
XL-1200		3026		1942	1230	2270

2.11.1.2 Base cutter (inch)



The effectively usable working surface (D x E) depends on the tool or module.

Type (in)	A	B	B1	C	D	E
M-800	32.7	82.1	20.5	60.7	32.7	52.4
M-1200				76.5	48.4	
M-1600				92.2	64.2	
L-1200	32.7	70.9	20.5	48.4	48.4	70.9
L-1600				92.2	64.2	
XL-1200				32.7	119.1	20.5

2.11.1.3 Cutter extension - CE (mm)



Type	CE0800 875	CE1200 1275	CE1600 1674
M-800	x		
M-1200		x	
M-1600			x
L-1200		x	
L-1600			x
XL-1200		x	

2.11.1.4 Cutter extension - CE (inch)



Type	CE0800	CE1200	CE1600
Length (in)	34.4	50.2	65.9
M-800	x		
M-1200		x	
M-1600			x
L-1200		x	
L-1600			x
XL-1200		x	

2.11.2 Weights

2.11.2.1 Base cutter (kg)

Type	Weight (kg)	max. floor load (kg/m ²)
M-800	420	200
M-1200	490	
M-1600	560	
L-1200	560	
L-1600	610	
XL-1200	620	

2.11.2.2 Base cutter (lbs)

Type	Weight (lbs)	max. floor load (lbs/in ²)
M-800	925	440
M-1200	1080	
M-1600	1240	
L-1200	1240	
L-1600	1350	
XL-1200	1370	

2.11.2.3 Material weight (kg)

Type	max. material weight (kg)	max. material weight (kg/m ²)
M-800	11	10
M-1200	16	
M-1600	21	
L-1200	22	
L-1600	29	
XL-1200	27	

2.11.2.4 Material weight (lbs)

Type	max. material weight (lbs)	max. material weight (lbs/in ²)
M-800	24	22
M-1200	35	
M-1600	46	
L-1200	49	
L-1600	64	

Type	max. material weight (lbs)	max. material weight (lbs/in ²)
XL-1200	60	

2.11.3 Electrical connection, power consumption

Electrical connection 400 V, 50/60 Hz

	Value
Voltage	3-phase, 400 V L1, L2, L3, N, PE
Mains frequency	50/60 Hz
Power input - 3 phases (without vacuum generator)	3.0 kW
Current consumption, 3 phases (without vacuum generator)	max. 16 A
Mains fuse, min. ¹	16 A

Electrical connection 208 V, 50/60 Hz

	Value
Voltage	3 phase, 208 V L1, L2, L3, N, PE
Mains frequency	50/60 Hz
Power input - 3 phases (without vacuum generator)	3.0 KW
Current input, 3 phases (without vacuum generator)	max. 16 A
Mains fuse, min. ¹	20 A

¹)Applies only to the basic unit. The minimum requirements for the mains fuse increase depending on the vacuum generator

Vacuum generator

For additional data see rating plate/original operating manual in chapter "Additional specifications." While the 1.1 kW vacuum pump is supplied with power via the cutter, the other vacuum generators are connected to a separate power supply.

The vacuum generator is selected according to the following criteria:

- Cutter model
- Desired application
- local mains voltage and frequency

1.1 kW vacuum pump

	Value
Voltage	3-phase, 400 V L1, L2, L3, N, PE
Mains frequency	50/60 Hz
Power input - 3 phases	1.1 KW

	Value
Mains fuse, min.	16 A

2.2 kW vacuum pump

	Value
Voltage	3-phase, 400 V L1, L2, L3, PE
Mains frequency	50/60 Hz
Power input - 3 phases	2.2 KW
Mains fuse, min.	16 A

2.55 kW vacuum pump

	Value
Voltage	3-phase, 208 V L1, L2, L3, PE
Mains frequency	50/60 Hz
Power input - 3 phases	2.55 KW
Mains fuse, min.	16 A

4 kW vacuum pump

	Value
Voltage	3-phase, 400 V L1, L2, L3, PE
Mains frequency	50/60 Hz
Power input - 3 phases	4 KW
Mains fuse, min.	16 A

12.5/14.5 kW vacuum pump

	Value
Voltage	3-phase, 400 V L1, L2, L3, N, PE
Mains frequency	50/60 Hz
Power input - 3 phases	12.5/14.5 KW
Mains fuse, min.	32 A

4.6 kW vacuum pump

	Value
Voltage	3-phase, 208 V L1, L2, L3, PE

	Value
Mains frequency	50/60 Hz
Power input - 3 phases	4.6 KW
Mains fuse, min.	20 A

Vacuum turbine 1 - 9 kW

	Value
Voltage	3-phase, 400 V L1, L2, L3, PE
Mains frequency	50/60 Hz
Power input - 3 phases	1 - 9 KW
Mains fuse, min.	32 A

Vacuum turbine 1 - 9 kW

	Value
Voltage	3-phase, 208 V L1, L2, L3, PE
Mains frequency	50/60 Hz
Power input - 3 phases	1 - 9 KW
Mains fuse, min.	50 A

2.11.4 Environmental conditions

	Value
Operating temperature	+10 °C to +35 °C
Storage temperature	-20 °C to +55 °C
Relative humidity	10 - 80%, non-condensing

2.11.5 Compressed air supply**2.11.5.1 Compressed air connection requirements****Important:**

The compressed air connection must fulfill the following requirements:

- **Air purity:** class 2.4.2 according to ISO 8573-1:2010
- **Air pressure:** 0.6 - 1.0 MPa depending on configuration

- **Air consumption:** base machine 20 l/min. 20 - 400 l/min depending on configuration

2.11.5.2 Compressed air settings

Compressed air regulator P1

	Air pressure [MPa]		max. air consumption [l/min]
	Maintenance unit	House connection	
Punch modules - PUM-S, PMM-S, PPM-S	0.7 - 0.8	0.7 - 1.0	150

Compressed air regulator P2

	Air pressure [MPa]		max. air consumption [l/min]
	Maintenance unit	House connection	
Electric Oscillating Tool - EOT-250	0.6	0.6 - 1.0	70
Universal Routing Tool - URT			60
Marker modules - MAM-SP, MAM-SPS, MAM-SPD			20
Router modules - RM-S			40
Sheet feeder feed			150
Sheet feeder removal			150
Base machine (vacuum elements)			covered with base consumption

Compressed air regulator P3

	Air pressure [MPa]		max. air consumption [l/min]
	Maintenance unit	House connection	
Minimal Quantity Lubrication - MQL	0.45	0.6 - 1.0	70
Material transport (transport elements, conveyor clamping elements)			covered with base consumption
Board loading device			covered with base consumption

Compressed air regulator P4

	Air pressure [MPa]		max. air consumption [l/min]
	Maintenance unit	House connection	
Pneumatic Oscillating Tool - POT	0.8	0.8 - 1.0	400
Scoring Cutting Tool - SCT			20
Passepartout Tool - PPT	0.6 - 0.8	0.6 - 1.0	20

2.11.6 Performance features**Accuracy**

	Value	Unit
Resolution of measuring system	0.005	mm
Positioning accuracy at a constant temperature	±0.1	mm
Repeat accuracy	±0.03	mm
Evenness of the worktop	0.4	mm

Cutting performance

	Value	Unit
Speed in vector direction	1 - 1414	mm/s
Max. acceleration in vector direction ¹	14.14	m/s ²
max. permissible printing force of the printhead (creasing)	100	N

¹depending on the module equipment and cutter size

2.11.7 Emissions**Noise emission**

Cutter noise emission

< 75 dB (A)

Depending on the cutting technology used, the machined material, the vacuum generator and the environmental conditions, the value can vary between <75 dB and ~85 dB.

Electromagnetic emissions

The S3 series meets the requirements of the following technical standards:

- EN 61000-6-2 EMC, interference resistance in industrial environments
- EN 61000-6-4 EMC, emission standard for industrial environments

Please ask the manufacturer if you wish to view to the test reports.

FCC approval

NOTE:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at its own expense.

NOTE:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3 Safety

This chapter contains information on the following:

- Definition of the intended use of the machine
- Generally applicable safety instructions and safety regulations to be observed
- Explanation of the meaning of symbols and pictograms which are used in this manual and in signs on the machine
- Overview of protective devices on the machine
- Listing of the required protective equipment
- Information on the applicable requirements for operating and maintenance personnel

Specific handling-related and situation-related safety instructions are given in the corresponding work steps in the following chapters of this manual and in other parts of the documentation.

3.1 General

Your safety – as the operator, service engineer or otherwise – is the primary concern. Certain situations, problems or faults that may occur on the machine could put your safety at risk if you are not aware of the steps you should take to avoid the resulting dangers.

State-of-the-art technology

The supplied machine corresponds to the state-of-the-art at the time of delivery.

However, the equipment may pose dangers if the safety instructions in this guide are not observed and implemented.

3.2 Proper use

Proper use of the machine is essential for its safe operation.

The equipment supplied is listed and labeled and indicates the usage possibilities of the machine. The machine is intended for use as an output device for CAD/CAM data for labeling and processing materials arranged on the table plate. Proper use and the usage restrictions are dependent on the module and tool system used and the available material transport system. Any other or further use is deemed improper. The user bears sole liability for any damage arising from improper use!

Use of the machine shall also be regarded as proper when:

- All nationally applicable safety regulations are complied with.
- The safety instructions in this operating manual are observed.
- The operating conditions are adhered to and the prescribed materials are used.

3.3 Examples of reasonably predictable unintended use

Unintended use of the machine can have the following consequences:

- serious injuries
- serious material damage to the machine
- loss of warranty

Examples of reasonably predictable unintended use of the machine include:

- Use of materials that are not defined in the contract and in this operating manual.
- Failure to observe the applicable parameters for the processing of the relevant material.
- Maintenance work on an unsafe machine.
- Failure to follow the operating instructions.
- Placing objects on the work surface.
- Processing of materials that are too large or too heavy.
- Processing of materials that are not fixed or are not adequately fixed.
- Processing of unsuitable materials such as steel, for example.
- Usage of a tooling system that is not intended for use with the material or the machine.
- Operating the machine without the designated protective devices.
- Use of modified module and tooling systems.
- Installation of spare parts and use of accessories and resources not approved by the manufacturer.
- Constructional changes to the machine, without subsequent risk assessment.
- Failure to observe the maintenance requirements.
- Failure to react to signs of wear and damage.
- Servicing work performed by untrained or unauthorised personnel.
- Operating the machine even though the operating instructions are incomplete or unavailable in the local language.
- Deliberate or careless interference with the machine during operation.
- Bridging or altering the protective equipment.

3.4 Hazard warnings, important instructions

Explanation of the notes

Both in the operating manual and on the device itself, dangers and important instructions are designated by special symbols and signal words as follows:



Danger:

The safety instruction **Danger**

- refers to imminent danger
- refers to operational and service risks
- warns of adverse health effects or even life-threatening injuries



Warning:

The safety instruction **Warning**

- refers to a dangerous situation
- refers to operational and service risks
- warns of adverse health effects or even life-threatening injuries



Caution:

The safety instruction **Caution**

- refers to a dangerous situation
- refers to operational and service risks
- warns of minor reversible injuries and other serious material damage and consequential damage



Note:

The safety instruction **Note**

- refers to operational and service risks
- warns of serious damage to the machine and other property damage and consequential damage



Tip:

Tip in combination with the light bulb refers to user tips and useful information which enhance the usability, prolong the service life of the machine and make the work significantly easier.



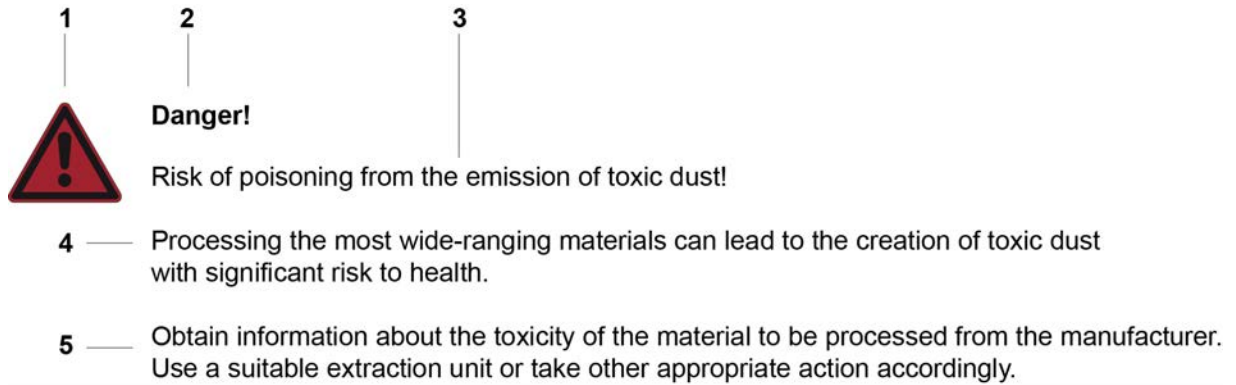
Tip:

With tips combined with the sheet, we provide usage tips and useful information which can improve the energy efficiency of the machine or optimize its environmental effects.

Important:

Usage tips and important information

Structure of the hazard warnings



- 1 Hazard symbol with the corresponding signal color
- 2 Signal word corresponding to the danger resulting from the situation
- 3 Description of the danger
- 4 Description of the consequences which could result from this hazardous situation
- 5 Possible actions and codes of conduct to prevent the hazard from occurring or to avert possible hazardous situations

3.5 Areas of responsibility

Manufacturer's areas of responsibility

- The manufacturer is responsible for the safe condition of the machine on delivery, including operating manual and accessories, according to the sales documentation.

Areas of responsibility of the owner or person authorised by them:

- Ensuring that only adequately trained personnel who have been properly instructed and have read and understood the content of the safety instructions in this chapter will operate and maintain this machine.
- Clearly defining the responsibility of the operating and service personnel as required in the operating manual.
- Checking the personal protective equipment of the operating and service personnel.
- Ensuring a technically safe state of the machine.
- Ensuring that servicing and maintenance are carried out according to the maintenance schedule.
- Notifying the manufacturer of any accident involving the machine that results in serious injury or substantial material damage.
- Decommissioning the machine immediately if defects arise that affect its operational safety.

Areas of responsibility of the operating and service personnel:

- Wearing the required personal protective equipment.
- Halting operation immediately in the event of faults.
- Reporting any changes which affect operational safety.
- Keeping the machine clean.
- Check the function of the EMERGENCY STOP control devices before starting work.

3.6 Personnel requirements

The operating and service personnel must

- be able to read and understand one of the languages on the command menu (e.g., German, English, French, Spanish, Italian).
- Be physically and mentally suited.
- Be qualified in the use of the machine by means of thorough training.
- Have read and understood the operating instructions/service manual.
- Be over the age of 16.
- Have knowledge of first aid and the use of fire extinguishers.

3.7 Personal protective equipment

The safety equipment required for operating the machine is dependent on the following factors:

- Module and tool system used
- Processing material used

When operating the machine or carrying out maintenance or servicing work, wear tight fitting clothing and appropriate personal protective equipment.



Warning:

Risk of injury from being caught or trapped in moving machine parts.

- Do not wear loose clothing, scarves, open jackets or open shirt sleeves.
- Remove all jewelry before starting maintenance and servicing work.

Personal protective equipment comprises of:

- Work clothes (service personnel),
- protective goggles (operating and service personnel):
 - To provide protection from particles during machining
 - To protect the eyes from dangerous radiation
 - To protect the eyes from chemicals
- Protective gloves where injury is possible due to:
 - burns
 - sharp or pointed objects.
- Chemical-resistant protective gloves where injury is possible due to:
 - chemicals (cleaning agents)
- Breathing protection when working with poisonous substances
- Hearing protection if the continuous sound pressure level is above 80 dB



Note:

You are personally responsible for:

- wearing the required personal protective equipment
- regular cleaning and maintenance of personal protective equipment;
- replacing damaged and unusable items of protective equipment promptly

3.8 Rules and occupational safety

- Operation of the machine is always subject to local regulations regarding work safety and accident prevention.
- Make sure that there is adequate lighting during operation.
- Check protective devices every time before starting the machine.
- If a hazardous situation arises, activate an EMERGENCY STOP control device to shut down the machine.
- You are not permitted to make unauthorised modifications or changes to the machine which might affect the system's safety. Accessories or spare parts made by other manufacturers may only be used with the machine with the written approval of the manufacturer.
- Only service technicians authorized by the manufacturer are permitted to install, commission, maintain and repair the machine.
- Before carrying out any maintenance, repair and modification work:
 - Switch off the machine using the main switch and secure it with a padlock.
 - Prevent the machine being switched on inadvertently by removing the mains supply cables to the power box (several mains connections available!).

3.9 Conduct in the event of malfunctions

As a matter of principle, all troubleshooting work or inspections on the machine should only be carried out when it is switched off.

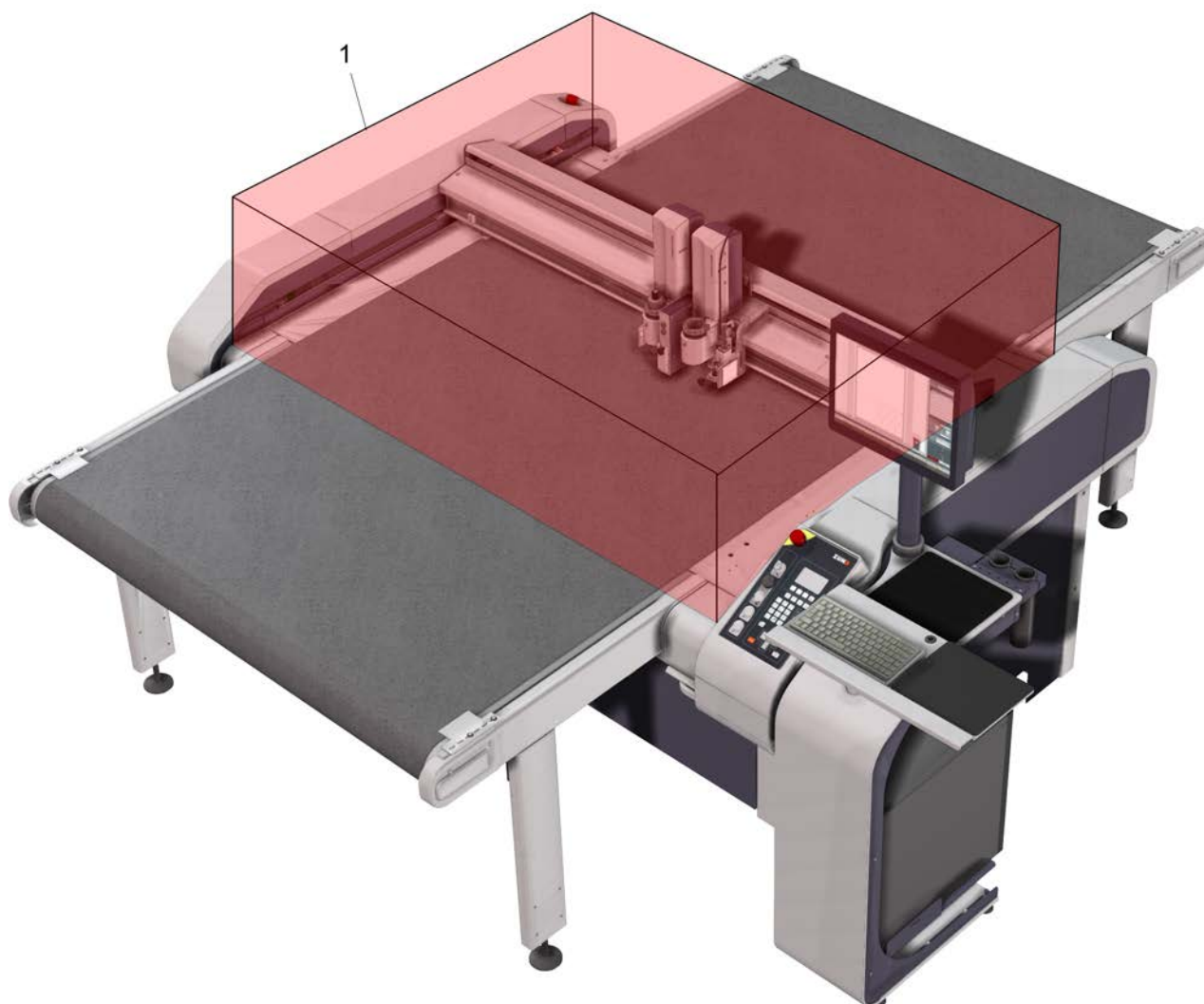
The following must never be bypassed or rendered ineffective:

- Light barriers on beams
- Monitoring sensors
- Safety and control switches of the machine

If malfunctions cannot be remedied by the operating personnel using simple means, inform the responsible service center!

3.10 Danger areas

3.10.1 General danger area



1 Danger area

The danger area is restricted to the working area or the active area of the drive system. Never reach into this work area during processing.

3.10.2 Danger area during initialization



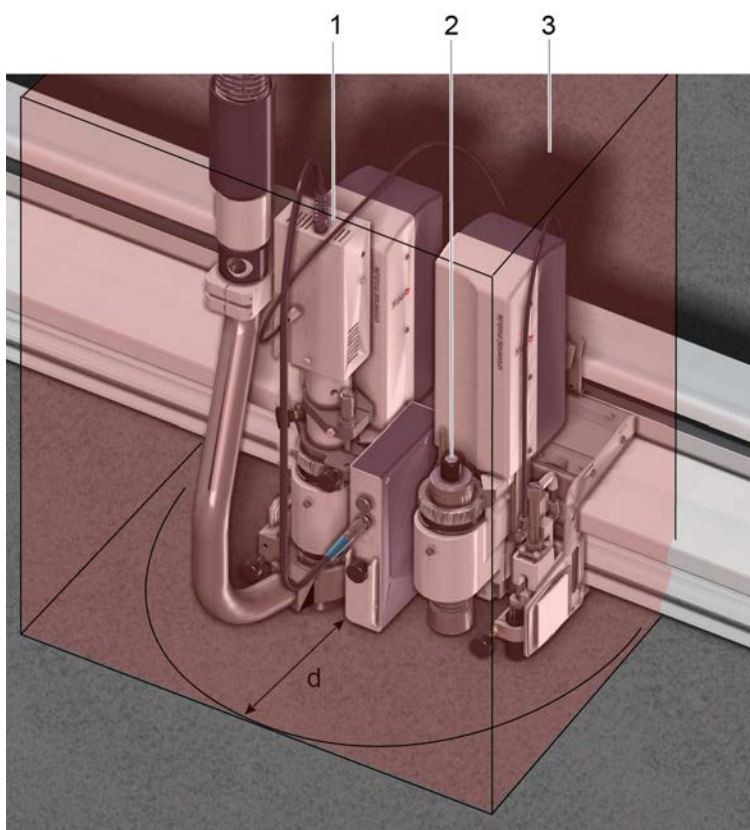
Caution:

Risk of injury during manual initialization of the tool!

The safety devices are not active during manual initialization

- Do not reach into the danger area during manual initialization

- For initialization, use automatic AKI initialization, if the tool allows this.



- 1 Module (e.g., UM-S)
- 2 Tool (e.g., UCT)
- 3 Danger area
- D Safety distance during initialization (25 cm)

The safety distance (d) for operating personnel during manual initialization is **25 cm**. Do not reach into the marked danger area during the initialization phase!

3.10.3 Danger area during cleaning



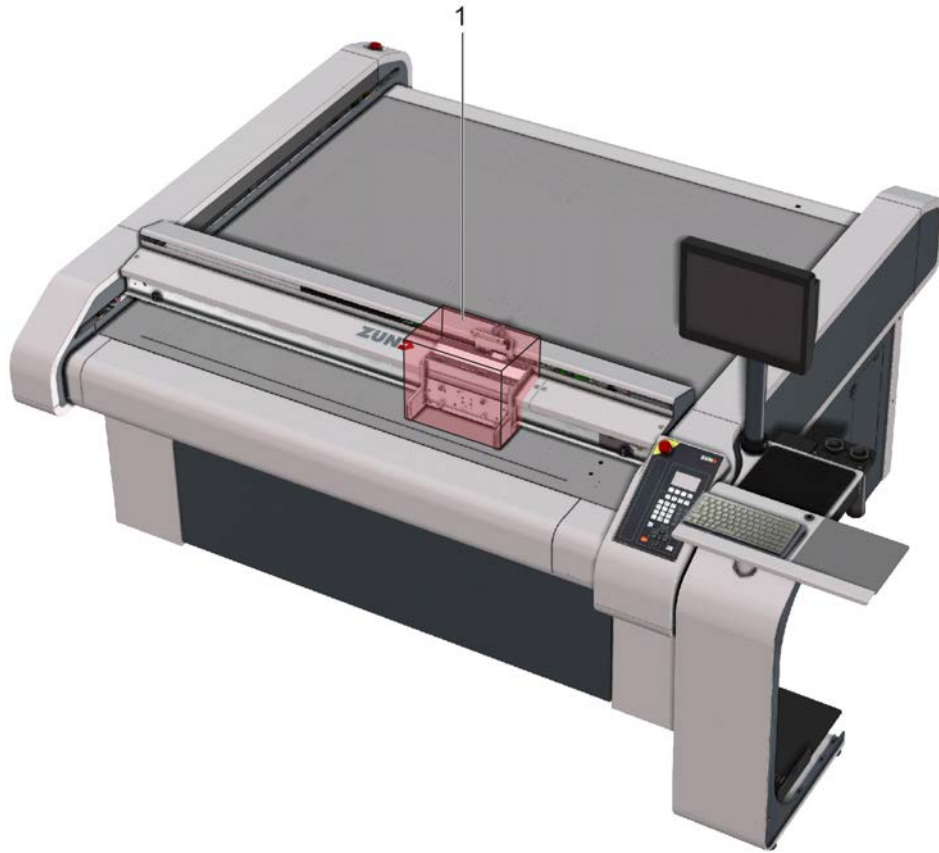
Caution:

Risk of injury when cleaning the machine!

Blades, router bits and punching inserts have very sharp edges which are sometimes hidden by moving equipment (spring-loaded gliding disc).

- Before starting to clean, remove all modules and tools from the module carriage.
- Switch off the machine with the main switch and secure it against unauthorised switch-on using a padlock.
- Disconnect the machine from the mains.

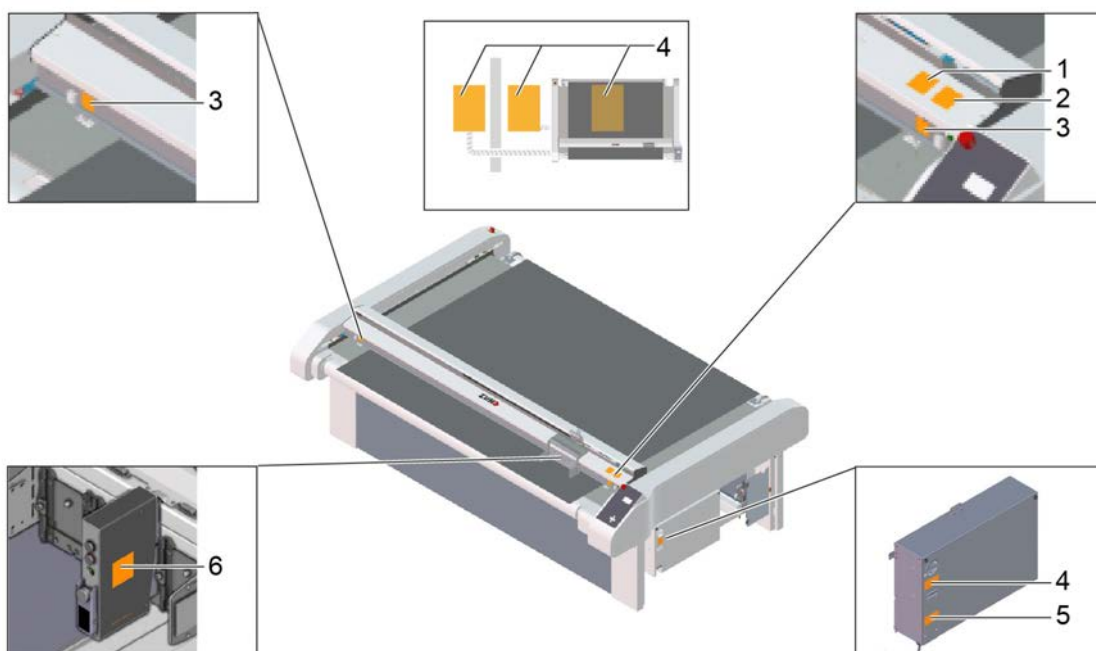
- While cleaning work is being performed, attach a sign that says "DO NOT SWITCH ON" that is prominently displayed on the main control panel of the machine.

































1 Danger area

3.11 Warnings on the product

The warnings on the modules and tools are illustrated in the respective operating instructions.



No.	Description	Variant 1 (CE)	Variant 2 (ANSI)				
1	Mandatory sign: Wear protective gloves	 Art. no.: 5800412 (50 mm)	 <table border="1" data-bbox="1125 1167 1501 1391"> <tr> <td></td> <td>CAUTION protective gloves required</td> </tr> <tr> <td></td> <td>PRUDENCE gants de protection obligatoires</td> </tr> </table> Art. no.: 5801106 (65 mm)		CAUTION protective gloves required		PRUDENCE gants de protection obligatoires
	CAUTION protective gloves required						
	PRUDENCE gants de protection obligatoires						
2	Mandatory sign: Wear eye protection	 Art. no.: 5800467 (50 mm)	 <table border="1" data-bbox="1125 1509 1501 1733"> <tr> <td></td> <td>CAUTION Eye protection required</td> </tr> <tr> <td></td> <td>PRUDENCE Protection obligatoire des yeux</td> </tr> </table> Art. no.: 5801058 (65 mm)		CAUTION Eye protection required		PRUDENCE Protection obligatoire des yeux
	CAUTION Eye protection required						
	PRUDENCE Protection obligatoire des yeux						

No.	Description	Variant 1 (CE)	Variant 2 (ANSI)																				
3	Warning sign: Hand injuries due to crushing	 <p>Art. no.: 5800342 (50 mm)</p>	 <table border="1" data-bbox="1173 280 1428 481"> <tr> <td colspan="2">⚠ WARNING</td> </tr> <tr> <td colspan="2">Crush hazard Keep hands clear of moving parts</td> </tr> <tr> <td colspan="2">⚠ AVERTISSEMENT</td> </tr> <tr> <td colspan="2">Risque d'écrasement Tenir les mains à l'écart des pièces mobiles</td> </tr> </table> <p>Art. no.: 5801059 (65 mm)</p>	⚠ WARNING		Crush hazard Keep hands clear of moving parts		⚠ AVERTISSEMENT		Risque d'écrasement Tenir les mains à l'écart des pièces mobiles													
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Risque d'écrasement Tenir les mains à l'écart des pièces mobiles																							
4	Warning sign: Electrical hazard	 <p>Art. no.: 5801338 (50 mm)</p>	 <table border="1" data-bbox="1141 593 1428 772"> <tr> <td colspan="2">⚠ WARNING</td> <td rowspan="2"></td> </tr> <tr> <td colspan="2">Hazardous power inside Disconnect all power supplies before servicing Service by trained personnel only</td> </tr> <tr> <td colspan="2">⚠ AVERTISSEMENT</td> <td></td> </tr> <tr> <td colspan="2">Tension dangereuse à l'intérieur Débranchez toutes les alimentations électriques avant d'effectuer la maintenance Maintenance réservée au personnel compétent uniquement</td> <td></td> </tr> </table> <p>Art. no.: 5802331 (95 mm)</p>	⚠ WARNING			Hazardous power inside Disconnect all power supplies before servicing Service by trained personnel only		⚠ AVERTISSEMENT			Tension dangereuse à l'intérieur Débranchez toutes les alimentations électriques avant d'effectuer la maintenance Maintenance réservée au personnel compétent uniquement											
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Tension dangereuse à l'intérieur Débranchez toutes les alimentations électriques avant d'effectuer la maintenance Maintenance réservée au personnel compétent uniquement																							
5	Warning sign: Electrical hazard	<table border="1" data-bbox="651 884 1029 1019"> <tr> <td>WARNING</td> </tr> <tr> <td>HIGH LEAKAGE CURRENT</td> </tr> <tr> <td>Earth connection essential before connecting the supply</td> </tr> <tr> <td>AVERTISSEMENT</td> </tr> <tr> <td>COURANT DE FUITE DE FORTE INTENSITÉ</td> </tr> <tr> <td>Mise à la terre impérative avant de brancher l'alimentation</td> </tr> </table> <p>Art. no.: 5200367 (110 mm)</p>	WARNING	HIGH LEAKAGE CURRENT	Earth connection essential before connecting the supply	AVERTISSEMENT	COURANT DE FUITE DE FORTE INTENSITÉ	Mise à la terre impérative avant de brancher l'alimentation	<table border="1" data-bbox="1053 884 1428 1019"> <tr> <td>WARNING</td> </tr> <tr> <td>HIGH LEAKAGE CURRENT</td> </tr> <tr> <td>Earth connection essential before connecting the supply</td> </tr> <tr> <td>AVERTISSEMENT</td> </tr> <tr> <td>COURANT DE FUITE DE FORTE INTENSITÉ</td> </tr> <tr> <td>Mise à la terre impérative avant de brancher l'alimentation</td> </tr> </table> <p>Art. no.: 5200367 (110 mm)</p>	WARNING	HIGH LEAKAGE CURRENT	Earth connection essential before connecting the supply	AVERTISSEMENT	COURANT DE FUITE DE FORTE INTENSITÉ	Mise à la terre impérative avant de brancher l'alimentation								
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COURANT DE FUITE DE FORTE INTENSITÉ																							
Mise à la terre impérative avant de brancher l'alimentation																							
6	Warning sign: Laser beam	<table border="1" data-bbox="651 1131 1029 1377"> <tr> <td>CAUTION PRUDENCE</td> </tr> <tr> <td>LASER RADIATION / DO NOT STARE INTO BEAM RAYONNEMENT LASER / NE PAS REGARDER EN DIRECTION DU RAYON</td> </tr> <tr> <td></td> </tr> <tr> <td>$\lambda = 650 \text{ nm}$ $P_o \ll 1 \text{ mW}$</td> </tr> <tr> <td>CLASS II LASER PRODUCT LASER DE CLASSE II</td> </tr> <tr> <td><small>Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007 Conformité 21 CFR 1040.10 et 1040.11, excepté pour les cas particuliers dans le cadre de la notice laser n°50, du 24 juin 2007</small></td> </tr> </table> <p>Art. no.: 5811418 (50 mm)</p>  <p>Art. no.: 5800344 (25 mm)</p>	CAUTION PRUDENCE	LASER RADIATION / DO NOT STARE INTO BEAM RAYONNEMENT LASER / NE PAS REGARDER EN DIRECTION DU RAYON		$\lambda = 650 \text{ nm}$ $P_o \ll 1 \text{ mW}$	CLASS II LASER PRODUCT LASER DE CLASSE II	<small>Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007 Conformité 21 CFR 1040.10 et 1040.11, excepté pour les cas particuliers dans le cadre de la notice laser n°50, du 24 juin 2007</small>	<table border="1" data-bbox="1053 1131 1428 1377"> <tr> <td>CAUTION PRUDENCE</td> </tr> <tr> <td>LASER RADIATION / DO NOT STARE INTO BEAM RAYONNEMENT LASER / NE PAS REGARDER EN DIRECTION DU RAYON</td> </tr> <tr> <td></td> </tr> <tr> <td>$\lambda = 650 \text{ nm}$ $P_o \ll 1 \text{ mW}$</td> </tr> <tr> <td>CLASS II LASER PRODUCT LASER DE CLASSE II</td> </tr> <tr> <td><small>Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007 Conformité 21 CFR 1040.10 et 1040.11, excepté pour les cas particuliers dans le cadre de la notice laser n°50, du 24 juin 2007</small></td> </tr> </table> <p>Art. no.: 5811418 (50 mm)</p> <table border="1" data-bbox="1053 1545 1428 1803"> <tr> <td colspan="2">⚠ WARNING</td> </tr> <tr> <td colspan="2">Laser radiation Do not stare into beam Laser class II</td> </tr> <tr> <td colspan="2">⚠ AVERTISSEMENT</td> </tr> <tr> <td colspan="2">RAYONNEMENT LASER NE PAS REGARDER EN DIRECTION DU RAYON Laser de classe II</td> </tr> </table> <p>Art. no.: 5801062 (40 mm)</p>	CAUTION PRUDENCE	LASER RADIATION / DO NOT STARE INTO BEAM RAYONNEMENT LASER / NE PAS REGARDER EN DIRECTION DU RAYON		$\lambda = 650 \text{ nm}$ $P_o \ll 1 \text{ mW}$	CLASS II LASER PRODUCT LASER DE CLASSE II	<small>Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2007 Conformité 21 CFR 1040.10 et 1040.11, excepté pour les cas particuliers dans le cadre de la notice laser n°50, du 24 juin 2007</small>	⚠ WARNING		Laser radiation Do not stare into beam Laser class II		⚠ AVERTISSEMENT		RAYONNEMENT LASER NE PAS REGARDER EN DIRECTION DU RAYON Laser de classe II	
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3.12 Protective devices



- 1 EMERGENCY STOP control device
- 2 Safety device (protective trip switch)
- 3 EMERGENCY STOP control device
- 4 Control panel

3.12.1 Safety device



Caution:

The beam may cause serious injuries in case of a collision.

Note that the high level of kinetic energy of the drive results in a significant braking distance.

Light barriers are no guarantee against injuries!

The protective system consists of light barriers on the bar ends and on the module carriage. The machine is stopped automatically if the light barriers detect an obstacle.

Effects for the cutter

- The drive motors (beams, module carriage) are slowed to a standstill.
- The Z-axis remains in the position where it is located when the safety device is triggered (e.g. lower position).
- The cutter switches to STOPPED mode.
- Safety-relevant units (modules, tools, etc.) are stopped and switched off.
- Units that are not safety-relevant or important for the operation of the machine, such as the operating unit, remain switched on.
- An error message is displayed.
- A warning tone sounds.

Effects on the options connected to the cutter

- Synchronised movements are stopped.
- Units that are not safety-relevant or important for the operation of the machine remain switched on.

Recommissioning

- Restore operational safety.
- Free the light barriers of obstacles.
- Acknowledge the error message on the control panel.

Tip:

If the Z-axis is in the upper or lower position when the safety device is triggered, it is now raised to the park position.

3.12.2 Control panel

Malfunctions are shown on the LCD display.

An acoustic signal sounds in the event of an error or light barrier interruption or activation of an EMERGENCY STOP control device.

3.12.3 EMERGENCY STOP control devices

Activating an EMERGENCY STOP control device triggers a machine standstill in the event of an emergency.



Danger:

Risk of injury due to inaccessible EMERGENCY STOP control device!

Machines with inaccessible EMERGENCY STOP control devices are not safe for operation. The machine cannot be stopped promptly in hazardous situations.

- Ensure that all EMERGENCY STOP control devices are easy to access and not hidden.



Note:

Risk of damage to the cutter by activating EMERGENCY STOP control devices.

Do not use EMERGENCY STOP control devices to switch off the machine under normal circumstances.



Note:

To unlock an activated EMERGENCY STOP control device after restoring operational safety, turn the switch clockwise (see [Reset EMERGENCY STOP control devices](#)[Reset EMERGENCY STOP control devices](#) on page 82[Reset EMERGENCY STOP control devices](#)[Reset EMERGENCY STOP control devices](#)).

3.12.4 Shutdown in an emergency

An emergency shutdown allows the machine to be stopped quickly in case of emergency.

Effects for the cutter

- The drive motors (beams, module carriers) are braked to a standstill and are then disconnected from the energy supply.
- The drive axes are free and can be moved by hand.
- The cutter switches to STOPPED mode.
- Safety-related units (modules, tools, auxiliary drive...) are isolated from the energy supply. Safety-related units (modules, tools...) are disconnected from the energy supply.
- Units that are not safety-relevant or important for the operation of the machine, such as the operating unit, remain switched on.
- An error message is displayed.
- A warning tone sounds.
- The EMERGENCY STOP control device remains locked in the off position.

Effects on the options connected to the cutter

- Synchronised movements are stopped.
- Units that are not safety-relevant or important for the operation of the machine remain switched on.

3.12.5 Shutdown in the event of overload

The machine automatically shuts down if an axis (X,Y, T, Z) becomes blocked or overloaded.

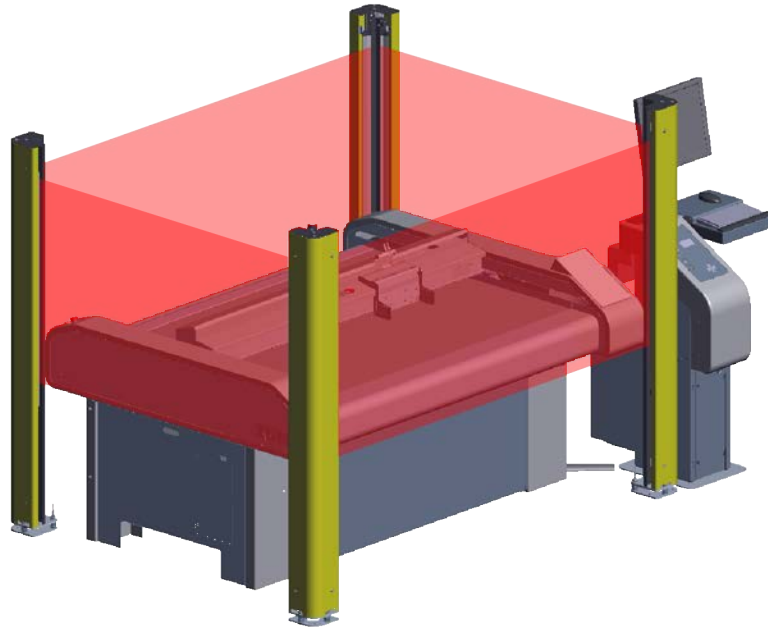
Effects for the cutter

- The drive motors (beams, module carriers) are braked to a standstill and are then disconnected from the energy supply.
- The drive axes are free and can be moved by hand.
- Safety-relevant units (modules, tools, auxiliary drive, etc.) are stopped or switched off. Safety-relevant units (modules, tools, etc.) are stopped or switched off.
- Units that are not safety-relevant or important for the operation of the machine, such as the operating unit, remain switched on.
- The cutter switches to the STOPPED operating mode
- An error message is displayed.
- A warning tone sounds.

Effects on the options connected to the cutter

- Synchronised movements are stopped.
- Units that are not safety-relevant or important for the operation of the machine remain switched on.

3.12.6 Light curtain (optional)



If the light curtain is interrupted by an object or person while an object is moving, the machine automatically comes to a standstill.

Effects for the cutter

- The drive motors (beams, module carriage) are slowed to a standstill.
- The Z-axis remains in the position where it is located when the safety device is triggered (e.g. lower position).
- The cutter switches to STOPPED mode.
- Safety-relevant units (modules, tools, auxiliary drive, etc.) are stopped or switched off.
- Units that are not safety-relevant or important for the operation of the machine, such as the operating unit, remain switched on.
- An error message is displayed.
- A warning tone sounds.

Effects on the options connected to the cutter

- Synchronised movements are stopped.
- Units that are not safety-relevant or important for the operation of the machine remain switched on.

Recommissioning

- Restore safe operating conditions.
- Ensure that the light curtain is not interrupted.
- Confirm the error message.

Tip:

If the Z-axis is in the upper or lower position when the safety device is triggered, it is now raised to the park position.

3.13 Mechanical hazards

3.13.1 Collection, retraction



Caution:

Risk of injury from entanglement, getting caught and being pulled in!
The machine and the tool system has moving parts.

Possible consequences

- Bruises, crushing, lacerations to fingers or hands
- Bruising to the head and arms
- Pulling out of hair
- Damage to clothing
- Damage to machine

Precautions during initialization and operation in ONLINE mode:

- Do not touch modules and beams
- Do not reach into the working and moving area
- Do not touch the table plate or the material lying on it
- Do not place hands on side covers
- Do not lean with the torso on the work surface
- Avoid untied long hair and loose clothing and ties

These precautions specifically apply if the cutter can be switched into ONLINE operating mode by the CAD/CAM system.

3.13.2 Hazards from foreign bodies



Caution:

Injury risk due to objects being ejected!

Foreign bodies on the table plate are collected by the beam or the module/tool/module carriage and pushed away!

Possible consequences

- Facial injuries and others
- Damage to the machine

Precautionary measures during initialization and operation in ONLINE/OFFLINE mode:

- Do not place any materials, tools, or other objects on the table plate or the side covers.
- Before operation, check whether there are any objects on the table plate or the side covers.

3.13.3 Cut and puncture injuries



Caution:

Injury risk from sharp objects!

Blades, router bits and punching inserts have very sharp edges which are sometimes hidden by moving equipment (spring-loaded gliding disc).

Possible consequences

- Cutting and stabbing injuries to the hands and arms

Precautionary measures

- Change the tool inserts with extreme caution.
- Do not enter the working area during initialization and during operation in ONLINE mode.

3.14 Risk of burns



Warning:

Risk of injury from burning!

Certain materials (metals) or tools (blade, router) reach very high temperatures during processing.

Possible consequences

- Burning injuries to the limbs

Precautionary measures

- Allow workpieces to cool down before removal
- Wear suitable protective gloves when removing freshly processed workpieces
- Allow tools (router, blade) to cool before removing them

3.15 Electrical hazard



Warning:

The machine is operated with a mains voltage of 400/208 V and a mains frequency of 50/60 Hz.

Possible consequences

- Risk of death or injury from electric shock.

Precautionary measures

- Only trained service personnel and authorized service technicians are allowed to open power boxes, switch boxes and electronics units.
- Ensure that the mains cables are protected against mechanical loads and are laid so that they are free from strain.
- Ensure damaged cables are replaced immediately.

3.16 Risks arising from the emission of toxic dust



Warning:

Risk of poisoning from the emission of toxic dust!

Processing certain materials can lead to the creation of harmful toxic dust.

- Obtain information about the toxicity of the material to be processed from the manufacturer.
- Use a suitable extraction unit or implement other appropriate measures accordingly.

The operator of the system is responsible for making sure that all national regulations concerning the maximum permissible dust concentrations in the workplace are complied with. When handling hazardous types of dust, all local safety regulations as well as the manufacturer's instructions must be observed. When routing or processing hazardous materials, always use dust extractors with special dust filters designed for the purpose. As an optional accessory, Zünd offers extraction systems that comply with the following regulations:

- the extraction of hazardous dusts with MAK values up to 0.1 mg/m^3 and wood dusts conforming to dust class M
- the extraction of dusts conforming to dust class H

3.17 Risks arising from the processing of toxic materials/materials hazardous to health



Warning:

Risk of poisoning from emissions when processing toxic materials!

Processing such a wide variety of materials can lead to toxic emissions (gases, dust etc.) that are hazardous to your health.

- Never process toxic materials/materials hazardous to health!
- Obtain information from the manufacturer of the material to be processed about its toxicity.

Observe the following guidelines when handling toxic/hazardous materials:

- The operator of the system is responsible for determining which processing materials are toxic/hazardous.
- It is forbidden to process toxic materials on Zünd cutters without appropriate additional safety measures!
- The operator of the system is responsible for installing appropriate additional safety measures!

3.18 Environmental hazards



Warning:

Processing residues, operating materials, cleaning agents etc. can cause damage and pollute the environment if they enter the soil, waterbodies or the sewage system.

Explanation of the hazard label



Hazard label for substances that are harmful to the environment



Safety regulations and protective measures

- Dispose of waste materials in accordance with current national environmental protection regulations. In case of doubt, check on the appropriate disposal methods with your local collection point or recycling center.
- Collect different chemicals in separate containers.

3.19 Handling and storage of chemicals



Warning:

Cleaning agents and operating materials can cause skin irritation and can therefore be hazardous to your health if handled carelessly.

Always wear your personal protective gear (protective gloves, goggles, mouth guard etc.) when handling chemicals.

Explanation of the hazard label



Hazard label for very toxic or toxic substances



Hazard label for hazardous substances or irritant materials



Hazard label for irritating substances

**Note:**

Chemicals classified as irritants are used to operate and clean this machine (cleaning agents, operating fluids). Safety datasheets for the substances in question can be downloaded from the Zünd homepage (www.zund.com).

Safe handling of chemicals**Important:**

Dispose of chemicals in accordance with national regulations. Follow the manufacturer's instructions (MSDS).

- Store chemicals in tightly closed containers in a cool, dry place (between 5 °C and 30 °C).
- Protect the containers from heat and direct sunlight.
- Provide good ventilation, including at floor level.
- Store chemicals in accordance with local regulations.
- Keep containers tightly closed.
- Use chemicals as intended only.

3.20 Risk of fire and explosion



Warning:

There is a risk of fire when routing and cutting flammable materials
Terminate the routing/cutting and leave the tool to cool off in case of

- smoke emission.
- Discolorations on the router/blade which point to increased heat development



Warning:

Risk of dust explosions

Flying sparks or electrostatic charges result in the risk of dust explosions during the extraction of different materials.

- Find information about the risk of explosion when processing the type of material that you are using and, if necessary, do not process it.
- If necessary, adjust the extraction to the required regulations.

Observe the following safety rules and countermeasures



- Find out the locations where fire extinguishers are kept and familiarize yourself with their use and operation. The adjacent sign indicates the location of a fire extinguisher.
- Do not use inflammable cleaning agents to clean the cutter.
- Store all processing materials in the proper manner in accordance with local guidelines.

Classes of fire

Refer to the following table to find out which type of fire extinguisher is used for each fire class:



Solid materials, mainly organic in nature; e.g. wood, paper, textiles, etc.

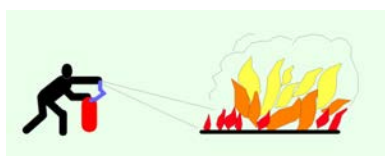


Liquid and liquefiable substances; e.g. gasoline, oils, grease, paints etc.



Combustible gases: e.g. methane, propane, etc.

Behaviour in the event of a fire



- Turn off the machine using the main switch
- Assess the situation: If there is danger, leave the area immediately and call the fire department. Only try to extinguish the fire if your personal safety is not at risk.
- Remove a suitable fire extinguisher (A, B, C) from its bracket and prepare it for use.
- Locate the source of the fire. Attack the fire with repeated short bursts from the extinguisher. Always spray the extinguishing agent from underneath into the source of the fire. In other words, always aim at the burning material and not at the flames.
- After using the fire extinguisher, do not return it to its usual place but have it refilled immediately.

3.21 Danger from laser beam

The optional ICC camera with laser pointer and the laser pointer use a visible laser beam. The laser beam is considered to be harmless to the human eye in case of short-term exposure (<0.25 s) (class 2 laser).

The ICC camera with laser pointer or the laser pointer are switched on together with the cutter. By design, the laser beam is directed down onto the material.

Safety instructions

- Do not look into laser beam.
- If a laser beam hits your eye, close your eyes or turn away immediately.
- Keep in mind that certain medications or consuming alcohol may cause a delayed blinking reflex.

3.22 Safety instructions for the operating personnel

This instruction manual cannot cover all possible situations and potential hazards.

It is therefore particularly important that operating personnel

- have been thoroughly trained and are aware of and able to correctly assess the hazards that can arise from the machine.
- Knows all protective devices on the machine.
- Request information from the manufacturer without delay if an undocumented, hazardous situation arises in connection with the machine.

In addition to these safety instructions, you must also observe the situation-related safety notes in the chapters "Controls and operation" and "Maintenance and cleaning".

3.23 Safety precautions for service personnel

The reliability, readiness and service life of the machine greatly depend on you carrying out your work in a conscientious manner.



Note:

Specialist knowledge and expertise are required to service and maintain the machine. The manufacturer provides this knowledge through training courses which are specially tailored for service personnel. Only personnel with Zünd certification are permitted to carry out service work on Zünd cutters.

3.24 Disposal

Information about proper disposal



The symbol has the following functions:

- Marking substances that are toxic and harmful to the environment
- Instructions for disposal of harmful substances
- Warning against disposal with domestic waste or environmental pollution caused by hazardous substances and objects contaminated with such substances

Measures for disposal

Zünd cutters correspond with the requirements of the German Electrical and Electronic Equipment Act and generally do not contain any poisonous substances or consumables.

Contact Zünd customer services or your service partner before you dispose of your cutter.

Dispose of cutting waste in accordance with current national environmental protection regulations.

In case of doubt, check the appropriate disposal methods with your local collection point or recycling center.

4 Controls and operation

This chapter familiarizes you with the controls, guides you through the operational procedures and describes the following operating steps:

- Daily commissioning
- Operation of the main components
- Detailed information on the operation of the machine
- Safe switch-off of the machine

4.1 Safe working practices



Danger:

Operating errors or negligence can put human lives at risk as well as causing serious damage to the machine!

The machine is fitted with safety devices to minimise risk. However, these safety devices cannot guard against damage as a result of operating errors or negligent working practices.

Observe the safety requirements from Chapter [Safety](#) on page 39 and the situational safety requirements of the appropriate working step.

Operator personnel are responsible for the safe use of the machine!

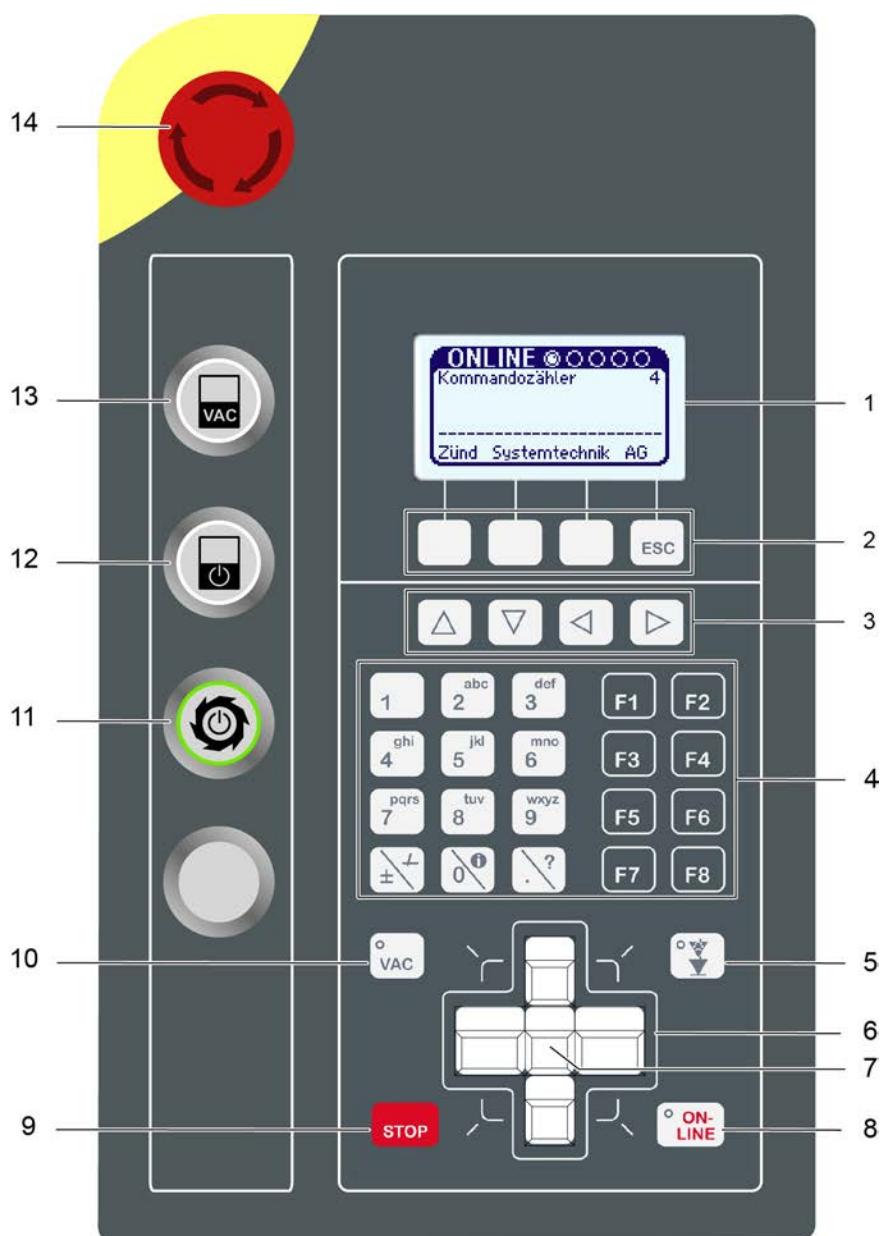
4.2 Controls

4.2.1 Overview



- 1 Rear EMERGENCY STOP control device
- 2 Control panel and workstation (optional)
- 3 Maintenance units (dependent on cutter configuration)

4.2.2 Control panel



- | | | | |
|---|--------------------------------|----|--------------------------------------|
| 1 | Display | 8 | ONLINE key |
| 2 | Soft keys | 9 | STOP key |
| 3 | Navigation keys | 10 | VAC (vacuum) key |
| 4 | Number block and function keys | 11 | Router on/off key (optional) |
| 5 | Tool up/down key | 12 | Front processing approval (optional) |
| 6 | Travel keys | 13 | Switch on front vacuum (optional) |
| 7 | SHIFT key | 14 | EMERGENCY STOP control device |

4.2.3 EMERGENCY STOP control devices

Activating an EMERGENCY STOP control device triggers a machine standstill in the event of an emergency.

The cutter is fitted with two EMERGENCY STOP control devices as standard. They are located as follows:

- 1 x on control panel
- 1 x on side support cover on left



Danger:

Risk of injury due to inaccessible EMERGENCY STOP control device!

Machines with inaccessible EMERGENCY STOP control devices are not safe for operation. The machine cannot be stopped promptly in hazardous situations.

- Ensure that all EMERGENCY STOP control devices are easy to access and not hidden.



Note:

Risk of damage to the cutter by activating EMERGENCY STOP control devices.
Do not use EMERGENCY STOP control devices to switch off the machine under normal circumstances.

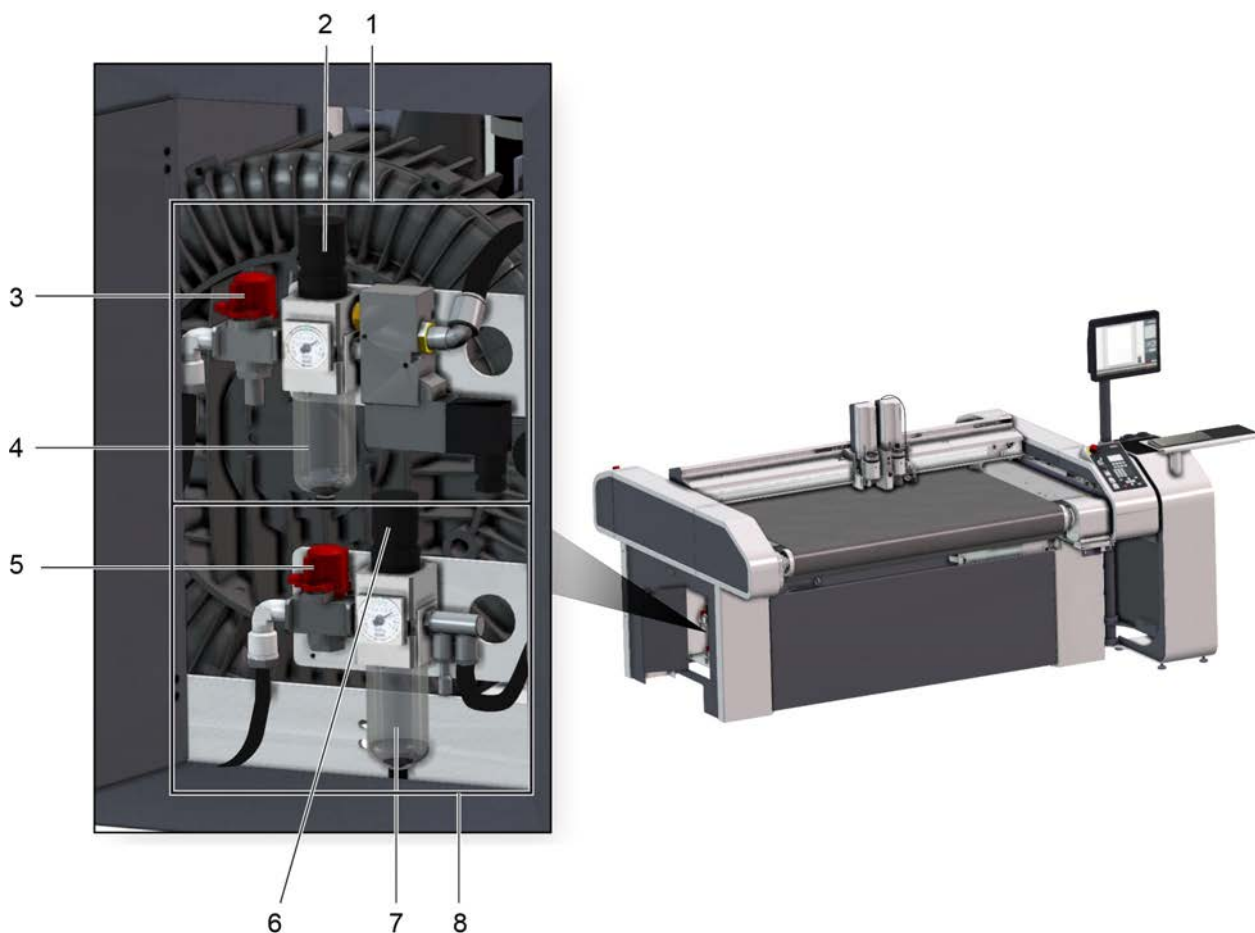


Note:

The activated EMERGENCY STOP control device remains locked in the off position.
To unlock an activated EMERGENCY STOP control device after restoring operational safety, turn the switch clockwise (see [Reset EMERGENCY STOP control devices](#) on page 82).

4.2.4 Maintenance unit

The maintenance unit adjusts the air pressure to the switching of the vacuum elements/various modules and options.



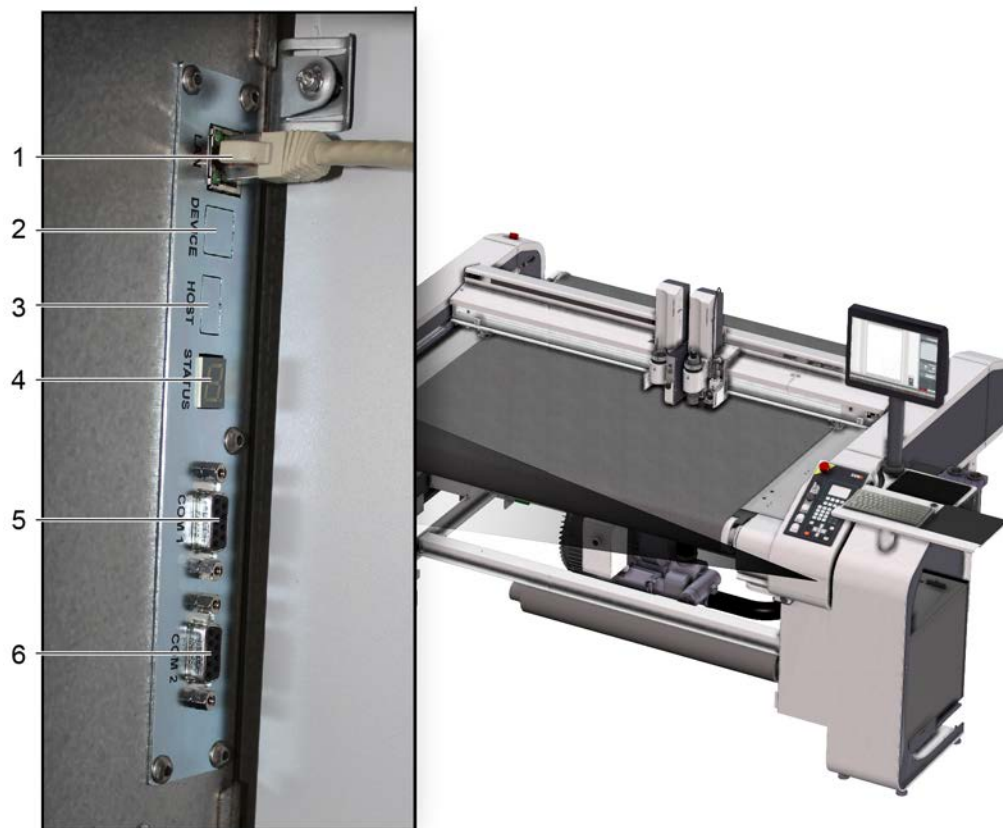
- 1 Maintenance unit, POT*
- 2, 6 Air pressure setting
- 3, 5 Stopcock
- 4, 7 Water separator
- 8 Maintenance unit, basic machine

The maintenance unit is preset and adjusted.

Check the air pressure setting at regular intervals. The setting values can be found in the chapter [*Basic unit compressed air supply*](#).

4.2.5 Interfaces

The machine has data exchange interfaces. These are attached to the electronics unit.







- 1 LAN
- 2 not used
- 3 USB (host) - not used
- 4 Status and error display
- 5 COM 1
- 6 COM 2

4.3 Menu navigation



4.3.1 Navigation keys




Functions in the cutter menu

Key	
 	Use these keys to navigate through the menu
	<ul style="list-style-type: none"> If submenus are available, use this key to change to the next menu level Select setting/function
	Switching from a sub-menu to the previous menu level


Function in the editor

Key	
 	Use these keys to move the cursor to the right or left

4.3.2 Help

Help texts are available for important menu entries. In order to display a help text, mark the required menu and press the  key.

4.3.3 Info menu

Within the menu the Info menu can be activated with the  key. The info menu also works in online dialog and when an error message is displayed.

Tab	Information
Assignment	Information on the module carriage
Module	Information about the module
Position	Specification of the current position of the current tool
Buffer	Information about the memory system
Job	Information about the print job
Status	Display of the user level, the operating mode...

Tab	Information
Function keys	Allocation of the function keys
Communication	Settings such as: interface, port, IP address, mask, MAC address

Switch between tabs with the   key. Scroll up/down within the tab with the   key.





4.3.4 Pop-ups, dialog boxes

Pop-up menus or dialog boxes are displayed for the following actions:

- Error messages (dialog)
- Cutter status display (dialog)
- Menus that are called up using function keys (pop-ups)

The system changes back to the previously active menu when a pop-up or a dialog box is closed.

4.3.5 Layout




Symbol	Description
	Menu
	Blocked menu (user level)
	Command, execute function
	Display of a value

4.4 Menus and functions

The cutter has a multitude of functions. The current menu number and the current menu are displayed in the header.

17183 Configuration	
1. Release time	400 ms
2. Setting time	400 ms



4.4.1 Navigation in the menu

A Scroll through the menu with the navigation keys   and select a sub-menu with .

B To return to the previous menu level, press the  navigation key. To return to the main menu, press ESC.

4.4.2 Selection



- A** Use the   navigation keys to select an entry from the list.
- B** Confirm the selection with **OK** and cancel by pressing **ESC**.

4.4.3 Select commands, functions

Mark the required command with the navigation keys   and select with .


The command can also be activated directly via the menu number. In order to do this, enter the menu number using the numeric keypad (see [Direct selection of menus](#) on page 74).

Important:

Commands are carried out immediately after entry. An exception to this rule are safety-relevant commands (e.g., automatic startup). Confirm the selection with **OK** or cancel with **ESC**.

4.4.4 Direct selection of menus

Each menu and each function is allocated a unique menu number. It is possible to switch between menus by entering the menu number.

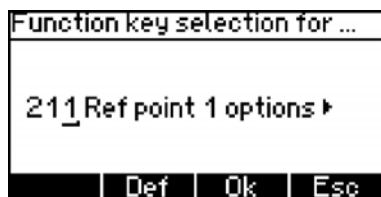
Two-figure menu numbers (10, 11...) are displayed lower down. Before entering two-digit menu numbers, press the  key and then enter both digits.

4.4.5 Function keys

The cutter has function keys (F1 - F8) which can be freely allocated to menu functions.

Allocate function keys directly

To change the function keys, at least the [User level](#) on page 76 "Operator" is required.



- A Simultaneously press the **SHIFT** key and the function key (F1 - F8) for which you would like to change the function.
- B The function key selection window opens.
- C Enter the menu number of the desired menu entry using the number field.
- D Confirm the selection with **OK** or cancel by pressing **ESC**.

Allocating the function key via the menu

To change the function keys, at least the *User level* on page 76 "Operator" is required.

- A Select the **6-5 Function keys** menu.
- B Enter the numbers **1 - 8** for the respective function key F1 - F8.
- C The function key selection window opens.
- D Enter the menu number of the desired menu entry using the number field.
- E Confirm the selection with **OK** or cancel by pressing **ESC**.

Resetting a function key to the factory settings

To change the function keys, at least the *User level* on page 76 "Operator" is required.

- A Change to the **6-5 Function keys** menu.
- B Enter the numbers **1 - 8** for the respective function key F1 - F8.
- C The function key selection window opens.
- D Press the **DEF** key to load the factory settings.
- E Confirm the selection with **OK** and cancel by pressing **ESC**.

4.4.6 Entering values

- A Select menu (e.g., **1-1-1-2-3 Up Z pos**).
- B Enter the value using the numeric keypad. The current value is overwritten.
- C Check the value and confirm with **OK** or cancel the entry using **ESC**.

4.5 General settings



4.5.1 Setting the language

- A Select **6-1 Language**.
- B Select the required language from the list and confirm.



4.5.2 Switch display lighting on/off

Press **Shift + ESC** to switch the display lighting on/off.

4.5.3 Setting the display contrast

Key	Description
Shift + 	Increase contrast
Shift + 	Reduce contrast

4.5.4 Setting the volume

Key	Description
Shift +  	Increase/decrease the volume

4.5.5 Clear buffer

Clear the data buffer following the termination or processing of a job.

Menu	Description
2-4-1 Clear buffer	All the data stored in the data buffer is deleted. The file may have to be resent.

4.6 User level

Access to menus and functions is blocked depending on the user level. The user levels have a hierarchical structure. This means that the next highest user also has the access rights to the menu functions of the subordinate user.

User level	Description
Users 1 - 3	All menus and functions needed for the operation of the machine are accessible
Operator	Simple, uncomplicated adjustments can be made
Service	Cutter settings that may only be adjusted by authorized service personnel.
Factory	-

4.6.1 Changing user levels

A Change to the **4-2 Password** menu.

B Enter your user code.

Results

The user level is approved and is displayed under **4-1 User level**.

4.6.2 Defining active user level after start-up

**Tip:**

After start-up, it is not possible to define a user level that is higher than your own as an active user level.

- A** Change to the **4-3 Start user** menu.
- B** Select the desired user.

Results

The selected user level will be active the next time the cutter is started.

4.6.3 Changing the password for user levels 2 and 3

**Tip:**

The passwords for user levels 2 and 3 can be changed in the Operator user level or higher.

- A** Change to the **4-4 Change password** menu.
- B** Select the user.
- C** Enter the new password for the user.

4.7 Malfunctions

4.7.1 Troubleshooting



Caution:

Risk of injury due to incorrectly remedied faults.

- Ensure that the error on the device is remedied correctly.
- Contact your Zünd partner.

Make note of the following information if you need help from the service department to rectify an error in your cutter:

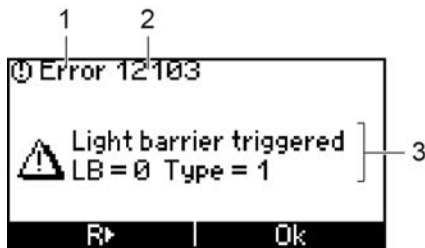
- The serial number of the machine.
- The error message that is displayed on the operating unit or on the status and error display.
- A description of the circumstances in which the error occurred.

4.7.2 Error localization

Errors can be localized both via the control panel, or, if the control panel is defective, via the [Status and error display](#) on the electronics unit.

4.7.2.1 Error display on the operating unit

The error code is made up of a multi-digit, uniquely allocated combination of numbers and letters. The signal word before the error code indicates how serious the error is.



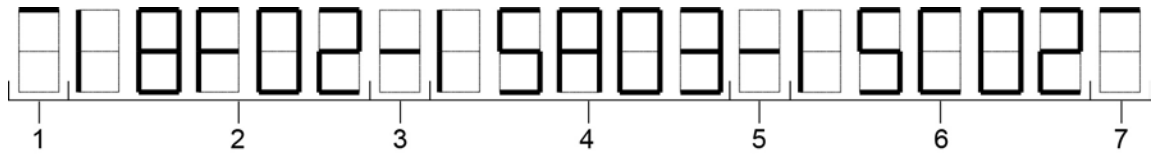
- 1 Signal word
- 2 Error codes
- 3 Error description

Signal word	Error code ends with	Error description
Information	01	Important information for the operating personnel
Warning	02	Notification of possible problems (overheating). Check status, troubleshooting, contact the service department if necessary
Error	03	Errors that are likely to be remedied - contact the service department if necessary
Alarm	04	Serious error - contact the service department

4.7.2.2 Error shown on the status and error display

The error is displayed as a sequence. All superfluous digits of the error code will be omitted in this display!

If several errors occurred one after the other then these are combined together in a group. The error which occurred first is displayed at the start of the group. All other errors follow in order.



Item	Sequence	Explanation
1	Introduction	The error group is introduced by an introductory sequence
2	Error code 1	Display of the first recorded error code
3	Separator	Display of the error is complete and another error follows
4	Error code 2	Display of the next error code
5	Separator	Display of the error is complete and another error follows
6	Error code 3	Display of the next error code
7	Conclusion	Display of the group has been completed

4.7.3 Error display

If a number of errors have occurred, then the first error of this sequence is always shown on the display of the operating unit.

All errors which have occurred after confirmation of the last error are collected together in a group.

Displaying the last group

All errors of the last group are displayed with SHIFT+ (2nd soft key).

Display list of unresolved errors

While the first error is shown on the display, with SHIFT+ (1st softkey) a list of all unresolved errors can be displayed.

4.7.4 Engaging the automatic circuit breaker



Danger:

Hazardous voltage in the power box
 Risk of death or injury from electric shock!

- Do not remove the internal power box cover (power unit) under any circumstances.

- Contact your service partner if you have any problems with the energy supply.

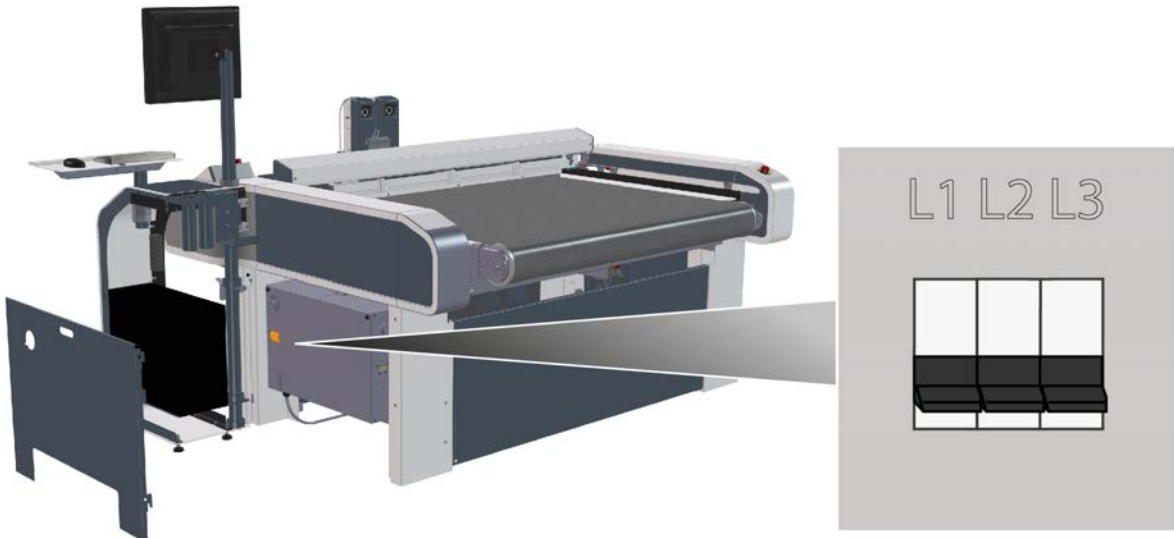


Note:

Risk of damage to the cutter

If an automatic circuit breaker has been triggered, the cause may be an electrical defect in a consumer.

- The list shows the consumers who are protected by the triggered automatic circuit breaker.
- Never start up a damaged cutter.
- Work on the electrical system should only be carried out by qualified electricians.



Fuse	Rated current	Consumer
L1	16 A type C	Cutter control, compressor, PC
L2	16 A type C	Extractor, various options
L3	16 A type C	Auxiliary drive, router converter

A Stop work.

B Remove the outer cover of the power box (see [Remove the power box cover \(A10, A21\)](#)).

C Push the switch lever upwards when the automatic circuit breaker is triggered.

Option

Description

The automatic circuit breaker triggers again

Shut down the cutter. Report the defect to your service partner.

The circuit breaker can be engaged; after continuing work, the circuit breaker triggers again

Shut down the cutter. Report the defect to your service partner.

The automatic circuit breaker can be engaged and triggers again after continuing to work

—

D Install the power box cover.

4.8 Daily checks prior to start-up



Caution:

There is a risk of injury if the machine is damaged! Machine faults can result in defects and accidents.

- Never start up a machine if it is damaged.
- Report all defects and faults to your supervisor and arrange for them to be rectified immediately by qualified personnel.

Ensure that all maintenance and service tasks are performed in accordance with the maintenance schedule.

Before starting up the machine each day, perform an inspection of the machine and check the following:

- Visually inspect the machine for damage.
- Remove local dirt caused by processing materials and dust.
- Remove objects from the work surface and the beam.
Remove objects from the work surface and the beam.
- Check whether all maintenance and service covers are installed correctly.
- Ensure that all EMERGENCY STOP control devices are easy to access and not hidden.

4.9 Behavior in dangerous situations

4.9.1 Shutdown in an emergency



When a hazard or a possibly hazardous situation occurs, activate an EMERGENCY STOP control device immediately.

Effects for the cutter

- The drive motors (beams, module carriers) are braked to a standstill and are then disconnected from the energy supply.
- The drive axes are free and can be moved by hand.
- The cutter switches to STOPPED mode.
- Safety-related units (modules, tools, auxiliary drive...) are isolated from the energy supply.
- Units that are not safety-relevant or important for the operation of the machine, such as the operating unit, remain switched on.
- An error message is displayed.
- A warning tone sounds.
- The EMERGENCY STOP control device remains locked in the off position.

Effects on the options connected to the cutter

- All potentially hazardous movements are stopped.
- Units that are not safety-relevant or important for the operation of the machine remain switched on.

4.9.2 Reset EMERGENCY STOP control devices



- A** Restore operational safety.
- B** Turn the EMERGENCY STOP control device clockwise to unlock.
- C** Acknowledge the error message on the control panel.

Results

The machine is ready for operation.

4.9.3 Commissioning a stopped machine

The cutter automatically shuts down under the following circumstances:

- An object is interrupting the light barrier.
- The safety device on the beam ends is triggered
- An object is interrupting the light curtain (optional).
- The distance between the two beams is too small.
- The drive of an axis is overloaded or blocked

- A Remove the object and restore operational safety.
- B Confirm the error message on the operating unit.
- C Bring the machine into ONLINE mode to continue processing.

4.10 Start-up

4.10.1 Switch on the machine



- 1 Main switch, off position
- 2 Main switch, on position

Switch the main switch to the ON position (Pos. 2)

Results

The cutter switches on. The start page appears on the display.

4.10.2 Initialize the machine




Caution:

Risk of injury due to automatic starting of the machine

Following initialization, OFFLINE mode is active. The cutter can receive commands from the operating software which activate the ONLINE mode.

Do not start the operating software until after initialization of the machine.


Press the  function key on the operating unit.

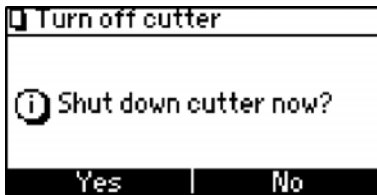
Results

The cutter is initialized.

4.10.3 Switching off the machine

A Switch the cutter to OFFLINE mode.

B Select the **12 Turn off cutter** function from the menu or press the key combination SHIFT + .



C Confirm the dialog with Yes.

D The start page appears on the display.

E Switch off the cutter with the main switch. If necessary, secure the main switch using a lock to protect the machine against improper startup.

F Clean the machine to remove dust and material residues.

4.11 operating mode

The cutter can be put into three operating modes:

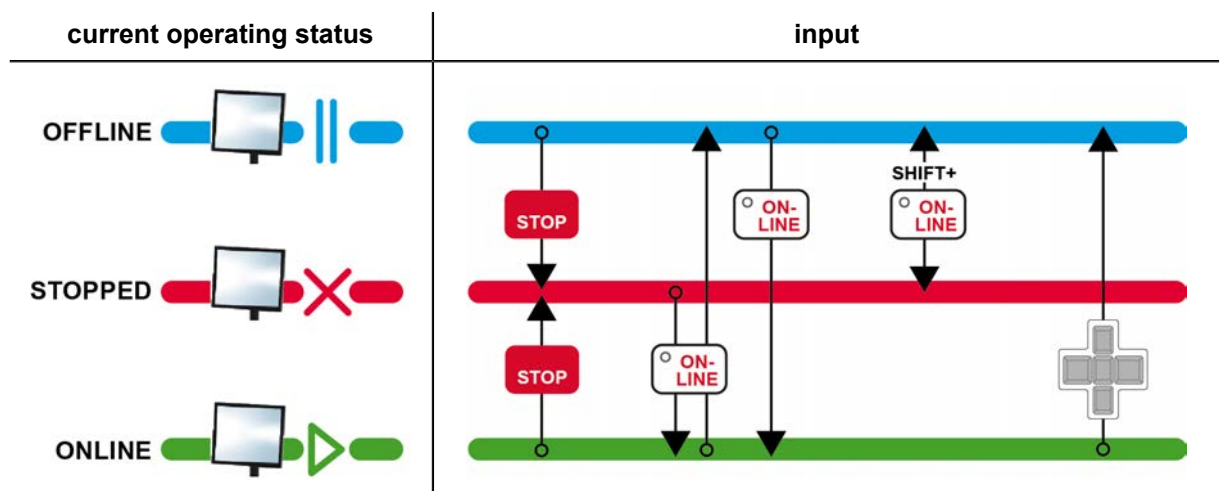
- OFFLINE
- ONLINE
- STOPPED

A combination of keys can optionally be used to switch from any operating status to either of the other two operating modes.

The current operating mode is displayed in the header of the main menu and with the LED of the ONLINE key.

4.11.1 Change operating status

The following graphic demonstrates how to change from the current operating mode to another mode:



4.11.2 OFFLINE



Caution:

Risk of injury due to automatic start-up of the cutter

In OFFLINE mode, the cutter receives commands from the operating software. These commands can be used to switch to **ONLINE** mode.

- Activate the **STOPPED** operating mode during breaks.
- Always perform set-up work on the machine in **STOPPED** mode.

After the cutter is switched on, **OFFLINE** mode is active. In this mode, external commands are received but they are not processed.

Operating software commands can be used to switch to the **ONLINE** operating mode.



A red flashing LED on the ONLINE key indicates that the **OFFLINE** operating mode is active.

4.11.3 STOPPED



Note:

The operating mode **STOPPED** protects the operator from the machine being set in motion using remote controls.

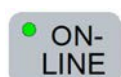
In this operating mode, commands are received but they are not processed. Even commands from the operating software (e.g., to change to the **ONLINE** operating mode) are ignored.



A red illuminated LED on the **ONLINE** key indicates that the operating mode **STOPPED** is active.

4.11.4 ONLINE

Commands are received and processed in this operating mode.



A green illuminated LED on the **ONLINE** key indicates that the operating mode **ONLINE** is active.

4.12 Moving the beam/module manually



The module carriage can be moved using the travel keys in the OFFLINE and STOPPED operating modes. The assignment of the keys corresponds to the direction of travel.

Pressing the SHIFT key at the same time will make the module carriage move faster.

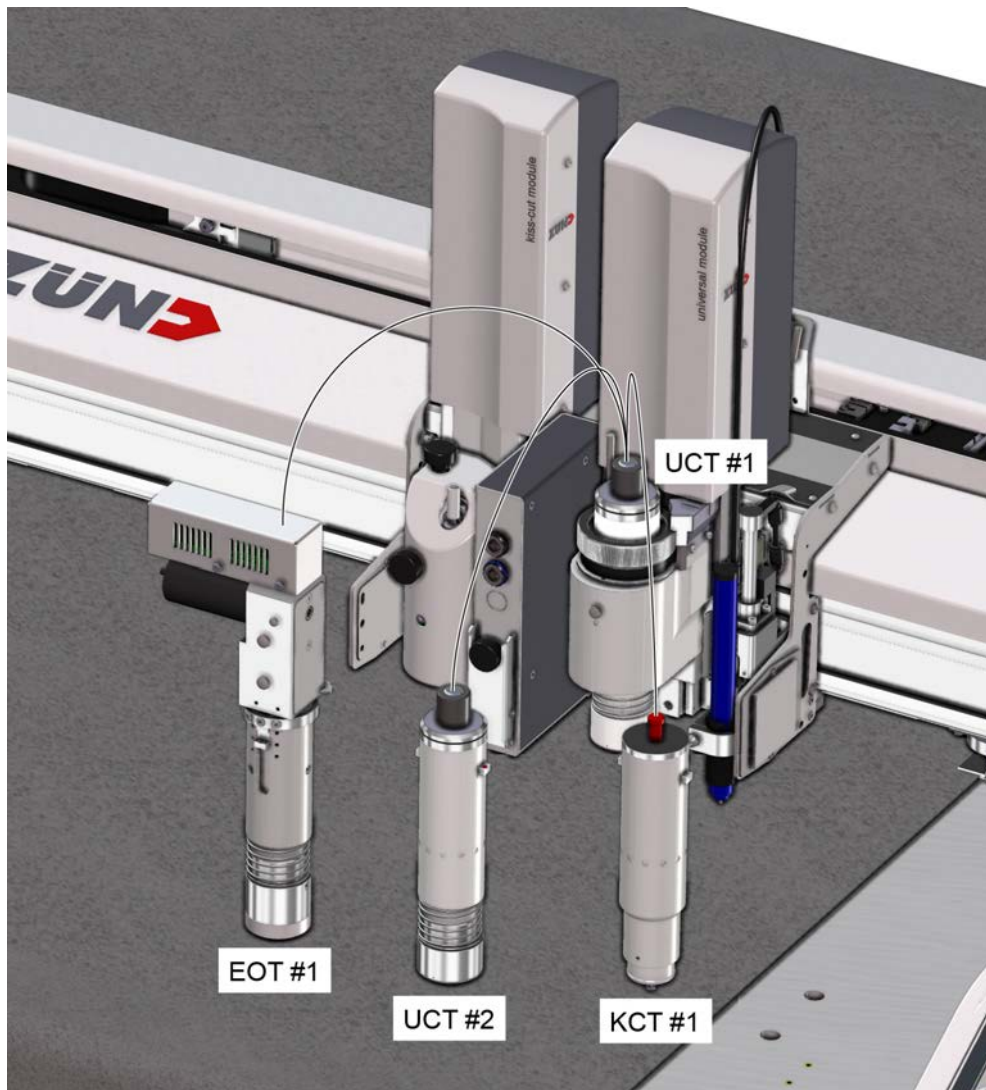
Pressing a travel key in the X and Y direction at the same time will make the module carriage move diagonally.

If one or more travel keys are pressed in ONLINE mode, then all movement is stopped and switches to the OFFLINE status.

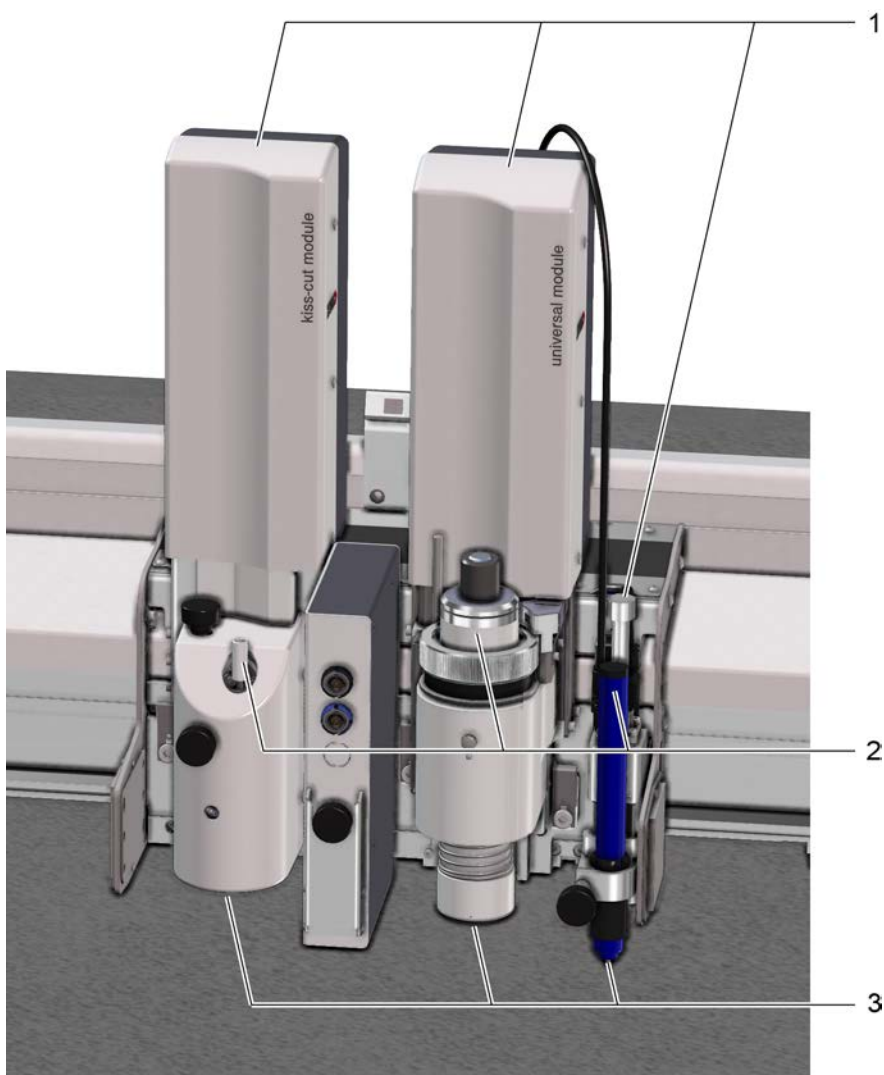
4.13 Handling modules/tools

Modules are independently recognized by the cutter control unit. Tools, on the other hand, do not have automatic recognition and must be manually allocated to a module.

Tool-specific parameters (initialization, moving speeds, acceleration) are saved to the corresponding tool and can be called up again at any time.



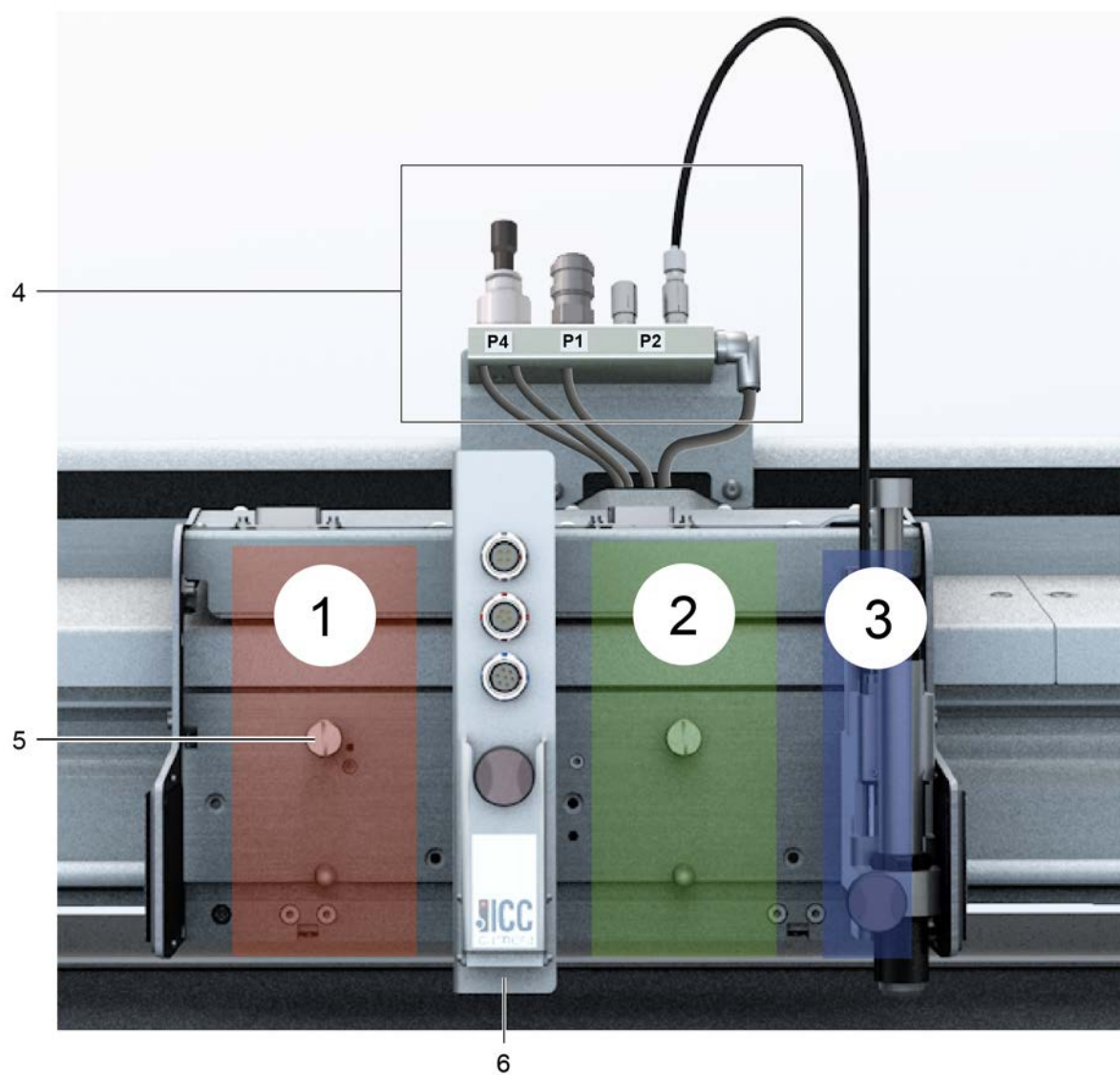
4.13.1 Module/tool/tool insert



- 1 Module (e.g., KCM-S, UM-S)
- 2 Tool (e.g. CT, UCT, EOT, POT)
- 3 Tool insert: router, blade, pen

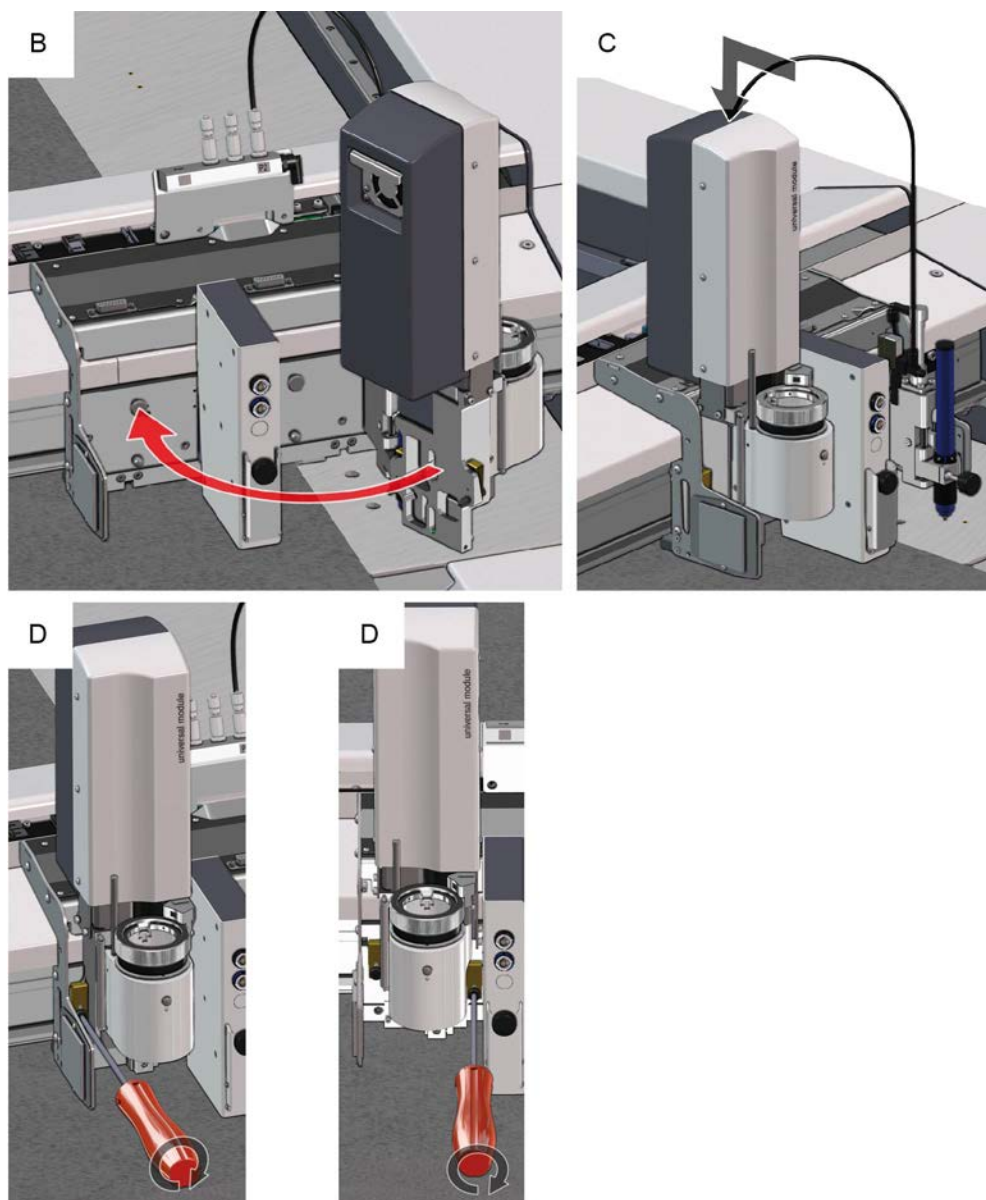
4.13.3 Inserting/replacing the module

4.13.3.1 Module carriage



- 1 Module carriage, slot 1
- 2 Module carriage, slot 2
- 3 Module carriage, slot 3 (reserved for marking module MAM-SE, MAM-SP)
- 4 Pneumatic connections
- 5 Guide pins
- 6 Laser pointer with electrical connections (optional)

4.13.3.2 Inserting a module



- A** Select **1-5-1 Change module/tool**. The module carriage moves to the module change position.
- B** Thread the module into the guide pin.
- C** Lower the module until the stop.
- D** Screw the module to the module carrier with the 4 mm Allen key (2x).

Results

The module is now mounted and is located by the software.

4.13.3.3 Removing the module

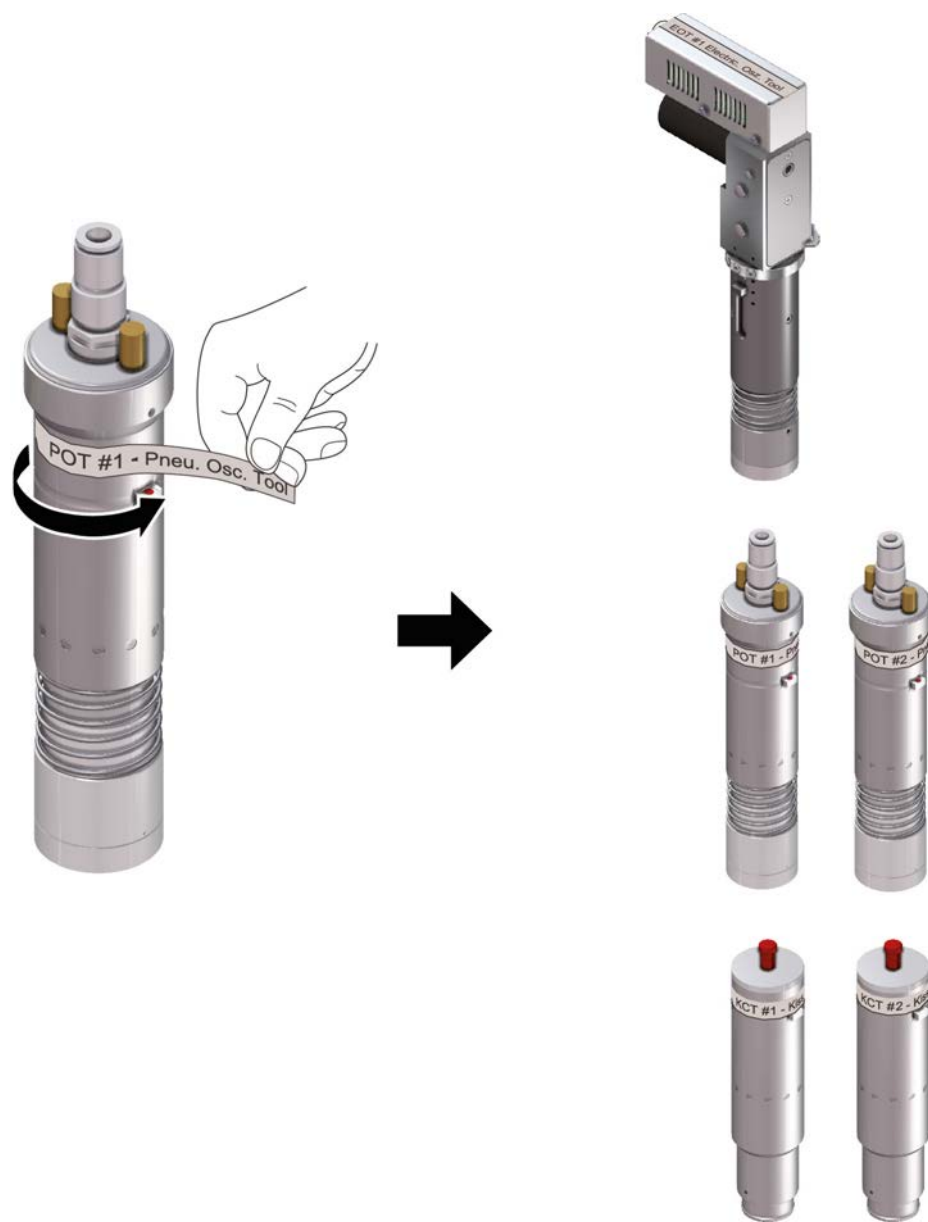
- A** Select **1-5-1 Change module/tool**. The module carriage moves to the module change position.
- B** Unscrew the module fixation with the 4 mm Allen wrench (2x).
- C** Raise the module and remove from the guide pin.

4.13.4 Activating a module

It is often necessary to activate a module in order to check the settings. This function can only be carried out in the main menu. The active module can for example be used as a pointer to define the vacuum width or the reference point.

Module	Key combination
Module 1	Shift + 1
Module 2	Shift + 2
Module 3	Shift + 3
ICC camera	Shift + 8
Laser pointer	Shift + 9

4.13.5 Marking the tool



Label all tools of the same type with a consecutive number. Corresponding adhesive labels are supplied with the equipment.

4.13.6 Tool manager

The tool manager is a user interface to handle tools in combination with a universal module (UM). A sensor on the module detects the **presence** of the inserted tool.

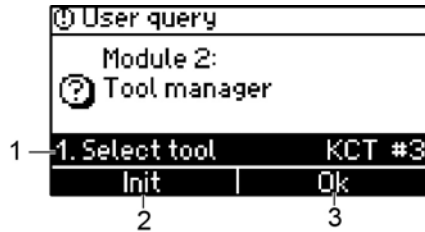
The tool manager helps you carry out the following activities:


- Inserting a tool
- Attach/select a tool
- Initialize a tool

4.13.6.1 Inserting/replacing the tool

- A Select **1-5-1 Change module/tool**.
- B If necessary, select the module/tool change position.
- C Insert the tool and - if electrically or pneumatically driven - connect to the power supply.
- D Confirm the selection with **OK**.

The tool manager opens.

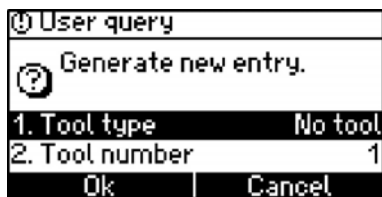


- 1 Use  to switch to the **1-1-1-1 Select tool** menu to select the tool used (see [Creating a new tool](#) on page 95 and [Selecting a tool already inserted](#) on page 96).
- 2 Use **Init** to switch to the menu for manual or automatic initialization. After initialization the parameters are saved. The tool manager closes and the main menu appears.
- 3 Confirm the tool selection with **OK**. The previously used parameters for this tool will continue to be used.

4.13.6.2 Creating a new tool

The tool is inserted in the module.

- A Select **1-1-1-1 Select tool** in the menu.
- B Select **NEW**.
- C The **Create new entry** pop-up menu opens.

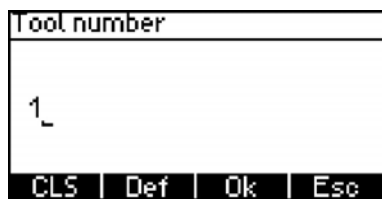


- D Select the **Tool type**.
- All tool types that can be used in the current module are displayed in the popup menu **Tool type**.



Select the tool from this list and confirm with **OK**.

- E Enter the appropriate number of the tool in the pop-up menu **Tool number** and confirm with **OK**.



4.13.6.3 Selecting a tool already inserted

- A Insert the tool.
- B Select **1-1-1-1 Select tool** in the menu.
In the **dialog**, **all tools already assigned to this module are listed**.
- C Select the tool inserted.

4.13.6.4 Deleting a tool

- A **1-1-1-1 Select tool** .
All tools already assigned to this module are listed in the **tool type** dialog.
- B Select the tool.
- C Delete the selected tool with `Delete`.

4.13.6.5 Saving tool-specific settings

Use `ESC` to change to the main menu.

Results

The tool-specific settings that have been made are automatically saved.

4.13.7 Connecting powered tools

Driven tools (e.g. EOT, DRT, POT) require an energy supply (electrical, pneumatic). This energy supply is controlled by the cutter control unit.

Electrically driven tools are connected to the connector control of the laser pointer or the ICC camera (optional). A port is allocated to each individual connection which must be assigned via the cutter control unit before the initial commissioning of the respective tool.

Pneumatically driven tools are connected to the pneumatic connections on the module carriage.

4.13.7.1 Connecting electrically driven tools



- 1 Connection 1 (port 1, black) - e.g. EOT
- 2 Connection 2 (port 2, red) - e.g. DRT
- 3 Connection 3 (port 3, blue) - e.g. EOT-250, URT

Procedure

The tool is applied and assigned to the module.

A Insert the tool into the color-coded connection provided.

B Allocate the corresponding port to the tool with **1-1-1-3-1-1 Port**.

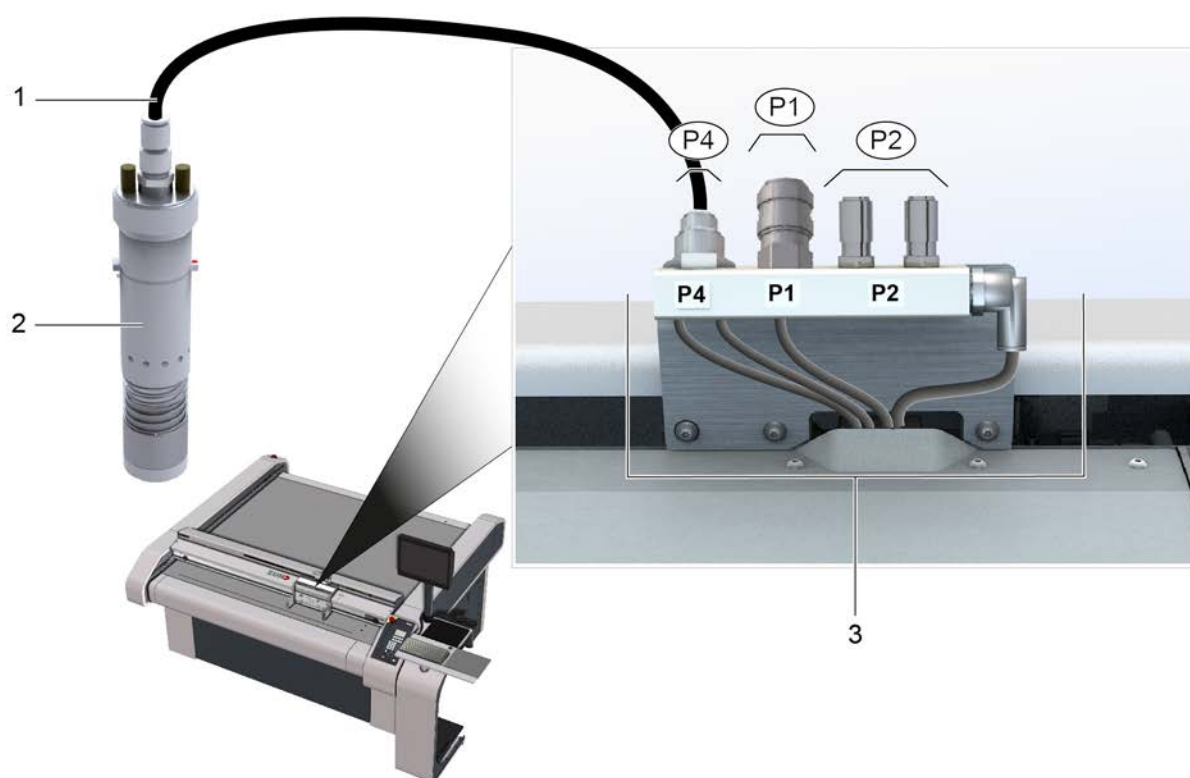
4.13.7.2 Connecting pneumatically driven tools

Pneumatically driven tools and modules are connected to the module carriage via the interface unit. The pressure is set using a maintenance unit. The air supply is connected to the local installation or supplied via a compressor. The connection data or the connection procedure can be found in the operating manual for the respective tool/module.



Note:

Always use a protective plug to protect connection P4 from dirt in the air supply. If particles of dirt get into the tool, it will be damaged. For more information, see [Mount protective stoppers for pneumatic connection](#) on page 100.



- 1 Compressed air hose
- 2 Pneumatically operated tool, e.g. POT
- 3 Interface unit
- P1 Compressed air connection P1 (e.g., PMM-S, PPM-S)

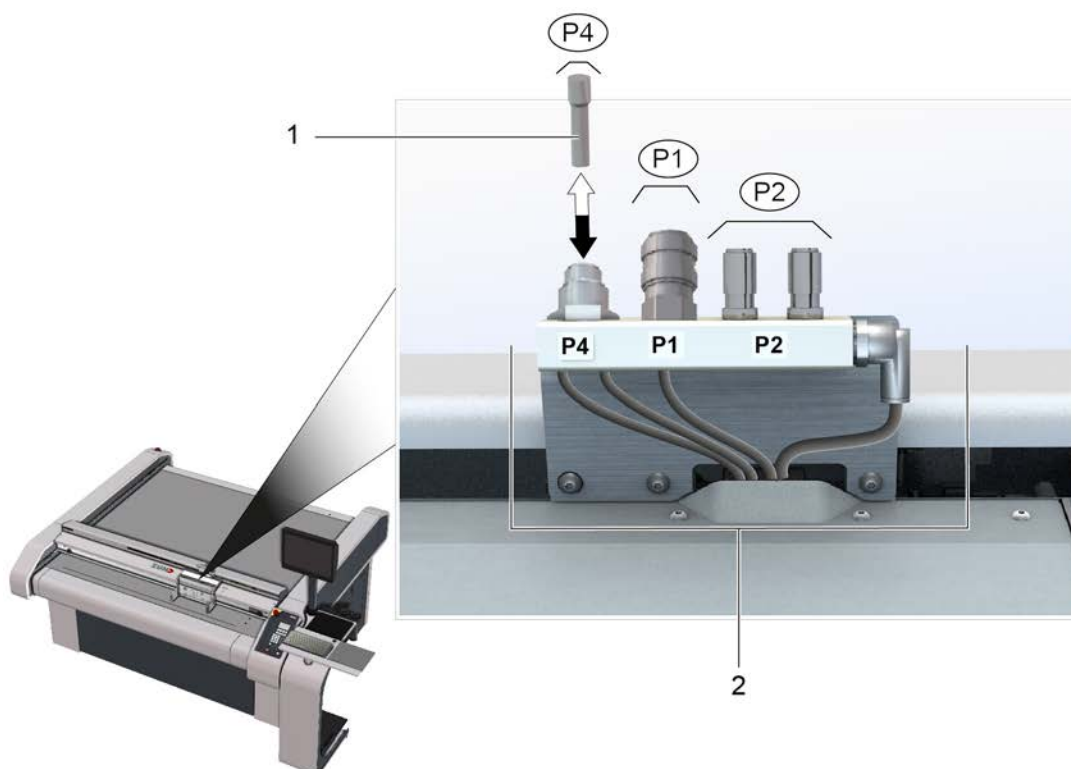
- P2 Compressed air connection P2 (e.g. sealing air EOT-250)
- P4 Compressed air connection P4 (e.g. POT)

4.13.8 Mount protective stoppers for pneumatic connection



Note:

Always use a protective plug to protect connection P4 from dirt in the air supply. If particles of dirt reach the tool, it will be damaged.



- 1 Protective plug
- 2 Interface unit
- P1 Compressed air connection P1
- P2 Compressed air connection P2
- P4 Compressed air connection P4

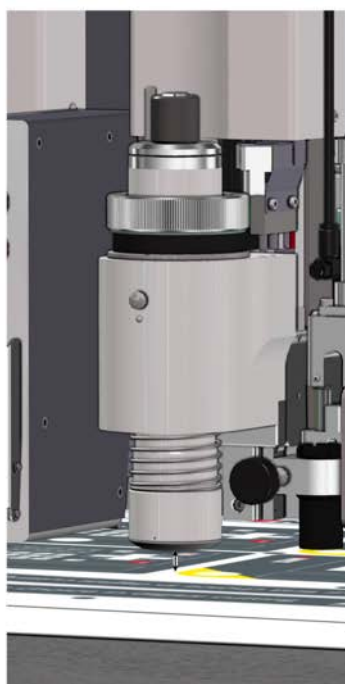
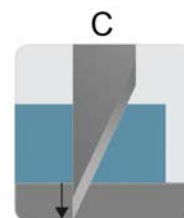
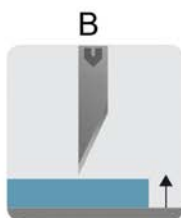
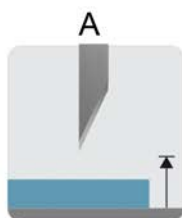
Procedure

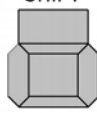
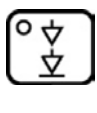




- A** Press down on air pressure connection coupling P4.
- B** Place the protective plug in the coupling.

4.13.9 Tool positions, Z axis

E.g.: UCT

After initialization, three tool positions can be moved to with .



Pos.	Position	Description	Key	Signal
A	Parking position	Moves to the highest position on the Z axis	SHIFT 	
B	Up position	Zero point + up position		
C	Down position	Zero point + Down position + Z offset		

4.14 Material fixing



The material is held down on the working surface via a vacuum. The working surface consists of a stable plastic perforated plate. Depending on the intended use, plates with varying hole sizes and patterns will be used. If the cutter is fitted with "Standard" and "Foil" plastic perforated plates, the width of the vacuum is continuously adjustable. In cutters with "Leather" plastic perforated plates, the vacuum width is not adjustable!

The strength of the hold-down is dependent on the vacuum generator used. Depending on the size and the power requirement, either a vacuum turbine or a gas ring vacuum pump is used for the S3-series.

Plastic perforated plate	Adjustable vacuum range
Standard	yes
Vinyl	yes

Plastic perforated plate	Adjustable vacuum range
Leather	no

4.14.1 Setting up

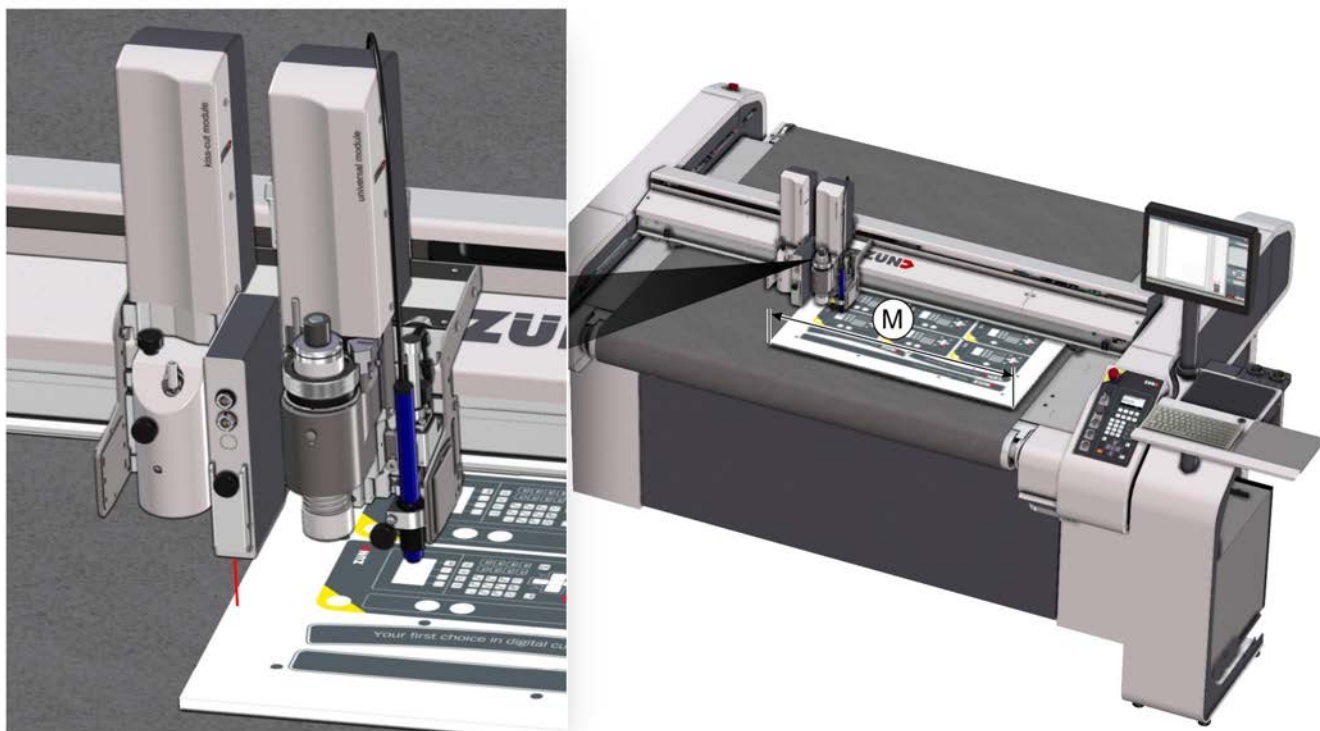
Cover the excess vacuum surface in order to achieve optimum material hold-down during the processing procedure.



- 1 Processing material
- 2 Covering the excess vacuum area

- A** If possible, position the material to be processed at the zero point of the work surface.
- B** Use a tarpaulin or an airtight material to cover the excess vacuum area.

4.14.2 Setting the vacuum range



Adjusting the vacuum range with the laser pointer

- A** Use the travel keys to position the pointer over the left edge of the processing material. For information on how the pointer is defined, see [Pointer selection](#) on page 126.
- B** Select the **1-8-3-4 Define vacuum range** function.

Results

The vacuum range has been defined.

Entering the vacuum width

- A** Use the key to change to the **1-8 Hold down functions** menu.
- B** Enter the width of the vacuum under **1-8-3-2 Vacuum width**.
- C** Press **OK** to confirm.

Results

The vacuum range has been defined.


Checking the range

- A** Use the key to change to the **1-8 Hold down functions** menu.
- B** Select the **1-8-3-6 Active zones** function.
- C** Confirm with **Start**.

Results

The pointer is positioned over the defined vacuum width.

4.14.3 Switching on and off

- A** Use the  key to change to the **Fixation menu3-1-1**.
- B** Switch the vacuum on and off with **Vacuum on/off (3-1-1-2)**.

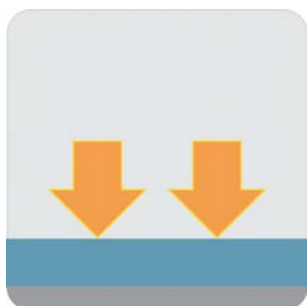
4.14.4 Switching between air cushion / vacuum (optional)

Important:

This function is only available if the vacuum generator is fitted with a vacuum pump that has a changeover valve.

Machines which are fitted with a vacuum pump with switching valve produce an air cushion between the processing material and work surface during material transport. The vacuum is switched on after the feed.

Vacuum



If Suction is activated, the processing material is held tightly against the work surface through suction. The processing material is held down against the work surface and does not move during processing.

Air cushion




If Blowing is activated, blowing is switched on before a feed instead of suction. An air cushion is created between work surface and processing material.

There are two variants to choose from.

- This air cushion remains in place throughout the entire feed and thus supports the material transport
- The air cushion is only turned on shortly before the material transport.

manual switchover/switch on

A Press the  key.

B Press the **3** key.

Results

- The air cushion switches on or off.
- It switches between suction and blowing if the vacuum was switched on beforehand.

Air cushion before or during the material transport

Menu	Setting
1-7-1-17-1 Air cushion	Switch short blast before material transport on or off.
1-7-1-5 Vac. beh.	always fixed time-optimised

4.14.5 Setting the vacuum intensity (optional)

Important:

Regulation of the vacuum intensity is only possible, if your machine is fitted with a vacuum turbine.

The output of the vacuum turbine is adjustable from levels 1-10. Levels 1-9 are regulated by the negative pressure sensor of the cutter controller.

At level 10, the vacuum turbine operates at the highest power level without regulation.

	9 kW / 15 kW / 15 kW plus
Level 1	10%
Level 2	20%
Level 3	30%
Level 4	40%
Level 5	50%
Level 6	60%
Level 7	70%
Level 8	80%
Level 9	90%
Level 10	max.



Tip:

Observe the following advice to achieve a best possible material hold-down:

- Select a vacuum level appropriate for your material. The material can be damaged if the vacuum is too high (e.g., corrugated cardboard).
- Cover open vacuum areas. This allows you to select a lower power level.
- Only use level 10 for materials that are air-permeable and then only when processing requires it.
- If the vacuum turbine audibly no longer works at a constant speed, too high a vacuum level is set. Select a lower output level.

A Select the **3-1-1-8 Power level** function.

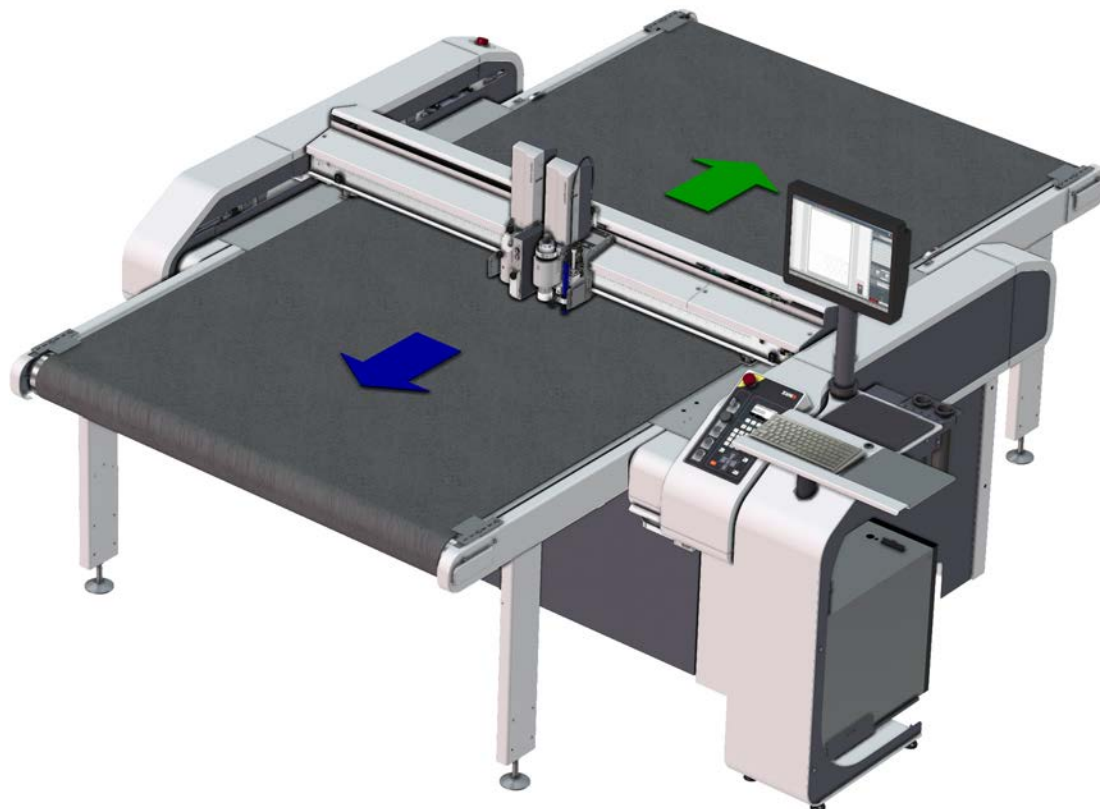
B Enter the required performance level and confirm with **OK**.

4.15 Material transport (optional)

The material transport system allows the processing material to be transported away on a conveyor belt following a completed work process.

The conveyor belt is gripped and fed using two clamping elements, while the processing material is held down with feeding clamps/a feed guide rail.

The arrangement and activation of the feeding clamps is determined based on the processing material. If a feed guide rail is used then all feeding clamps are activated/in fixed positions.



4.15.1 Feeding clamps



- 1 Compressed air on/off
- 2 Fixation of the feeding clamps

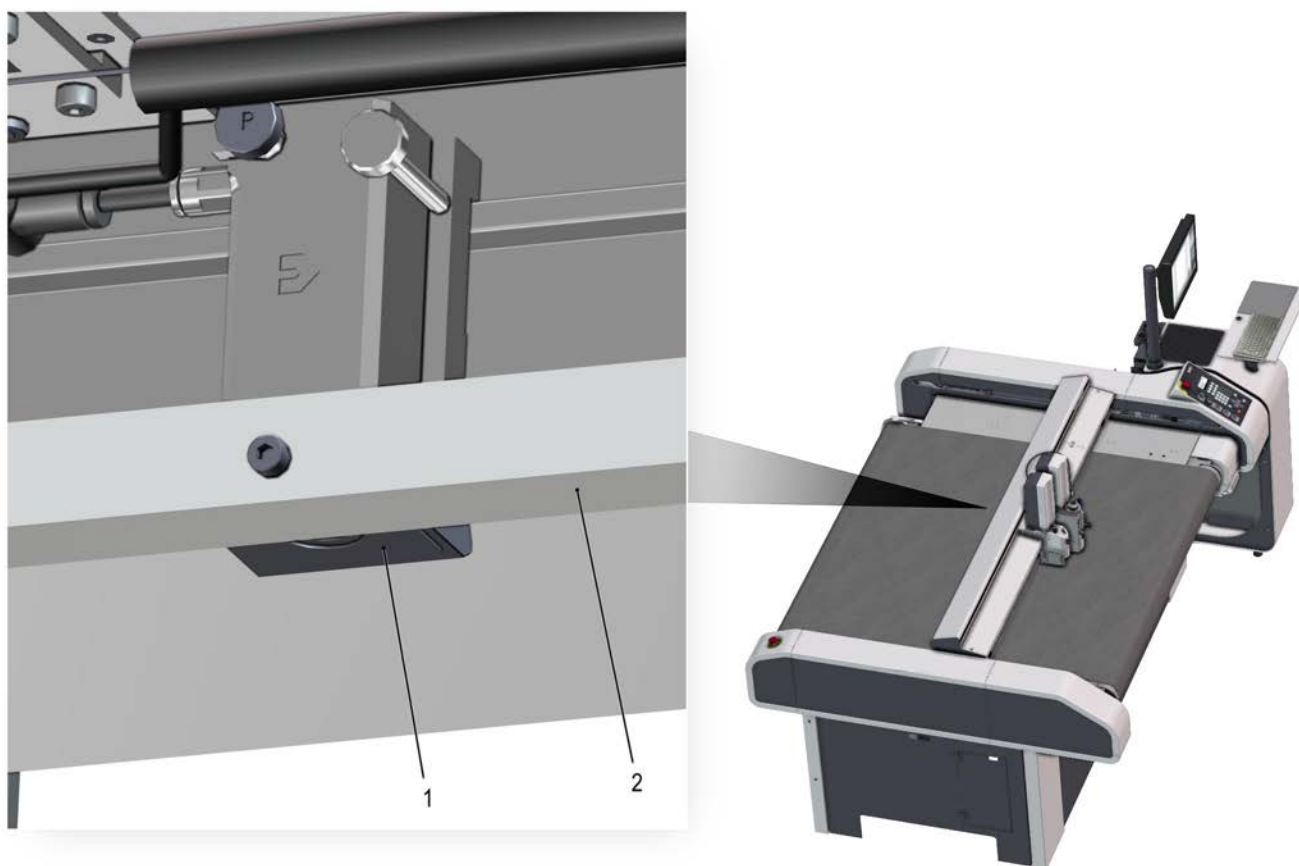
Adjusting the feeding clamps

- A** Loosen the screw for fixing the feeding clamps.
- B** Position the feeding element (pay attention to the hose length).
- C** Tighten the screw for fixing the feeding clamps.

Activating/deactivating feeding clamps



- A** Turn the compressed air on/off screw clockwise to deactivate the vacuum element.
- B** Turn the screw anti-clockwise about three rotations to activate the vacuum element.

4.15.2 Feed guide rail



- 1 Feed guide rail
- 2 Feed element

Mounting the feed guide rail

- A** Turn off the cutter with SHIFT .
- B** Release the fixation of the feed elements.
- C** Position the feed elements.
- D** Loosely screw the feeding bar to all feed elements using the supplied self-locking screws.
- E** Tighten the fixation of the feed elements.
- F** Switch the cutter on with .
- G** Lower (**1-7-2-3 Lower feed clamps**) and raise (**1-7-2-3 Lift feeding clamps**) the feeding bar several times for inspection purposes.

4.15.3 Feed

The following parameters can be set in the cutter menu:

- Speed
- Acceleration
- Feeding mode
- Function of the feeding clamps

- Feed direction

Automatic feed



The feed length is defined (**1-7-1-2 Length**) during automatic feeding. If necessary, a starting point can also be defined for the feed. If a feed is started, the module carriage moves to the starting point of the feed. The feeding clamps are lowered and the conveyor clamp elements grip the conveyor belt. A feed is executed. If the feed length is greater than the length of the work surface, this process is repeated until the specified length is reached.

Manual feed

- A** Lower the feeding clamps (**1-7-2-3 Lower feed clamps**).
- B** Carry out a feed using the travel keys.
- C** Raise the feeding clamps (**1-7-2-3 Lift feeding clamps**).

4.16 Automatic tool initialization - AKI (optional)



Tip:

Manual initialization is described in the operating manual of the relevant tool. See chapter "Tools".



1

2

3

- 1 AKI holder on the table plate
- 2 AKI
- 3 Storage tray

**Note:**

Risk of damage to the cutter

Use automatic tool initialization for compatible tools only!

The following tools can be initialized using automatic tool initialization:

- KCT, Kiss-Cutting Tool
- UCT, Universal Cutting Tool **without fixed gliding shoe**
- EOT, Electric Oscillating Tool
- POT, Pneumatic Oscillating Tool
- DRT, Driven Rotary Tool
- URT, Universal Routing Tool, **position mode**
- SCT, Scoring Cutting Tool
- RM-S, Routing modules

The following tools are **not** compatible with automatic tool initialization

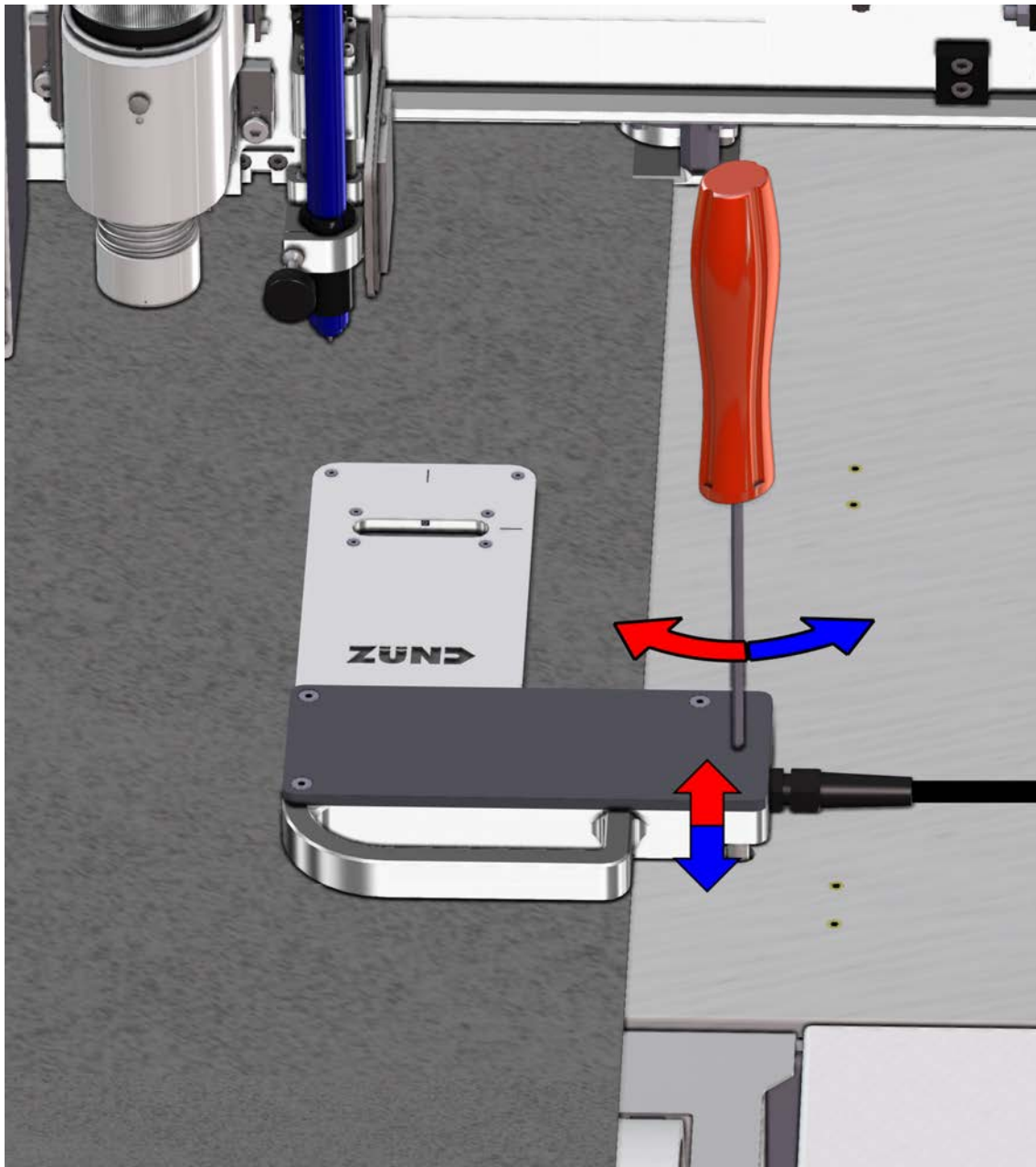
- UCT, Universal Cutting Tool with fixed gliding shoe
- CTT1, Creasing Tool type 1
- CTT2, Creasing Tool type 2
- SDT, Drawing Tool
- URT, Universal Routing Tool, **pressure mode**
- PTT1, Perforation Tool Type 1
- Punch tools

4.16.1 Adjusting the height



Tip:

Make sure the automatic tool initialization is flat on the cutting surface (conveyor belt). Adjust the height if necessary!



- A** Rotate the adjusting screw counterclockwise.
- B** Place the AKI on the cutting surface.
- C** Adjust the inclination with the adjusting screw so the AKI rests flat on the cutting surface.

4.16.2 Initialization process



Caution:

Risk of injury during tool initialization!

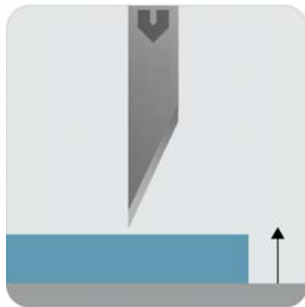
The front light barriers are not active during manual initialization!

- Do not touch the operating area of the tool during initialization.
- Define the zero point with the AKI.



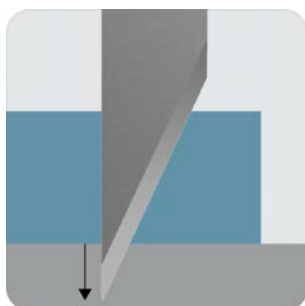
1-1-1-2-2 Auto init

Using AKI, the tip of the tool insert is set exactly to the height of the working surface (cutting/routing base). This value serves as a starting point for setting **the up position** and **the down position**.



1-1-1-2-3 Up Z pos

The up position defines the distance between the zero point and the raised tool. Select this value according to the material and its folding properties. A short distance between processing material and raised tool generally means a shorter processing time.



1-1-1-2-4 Down Z pos

The down position defines the cutting depth of the tool into the cutting/routing base. This is necessary in order to cut completely through the processing material. Down position is dependent on the processing material and the processing method.

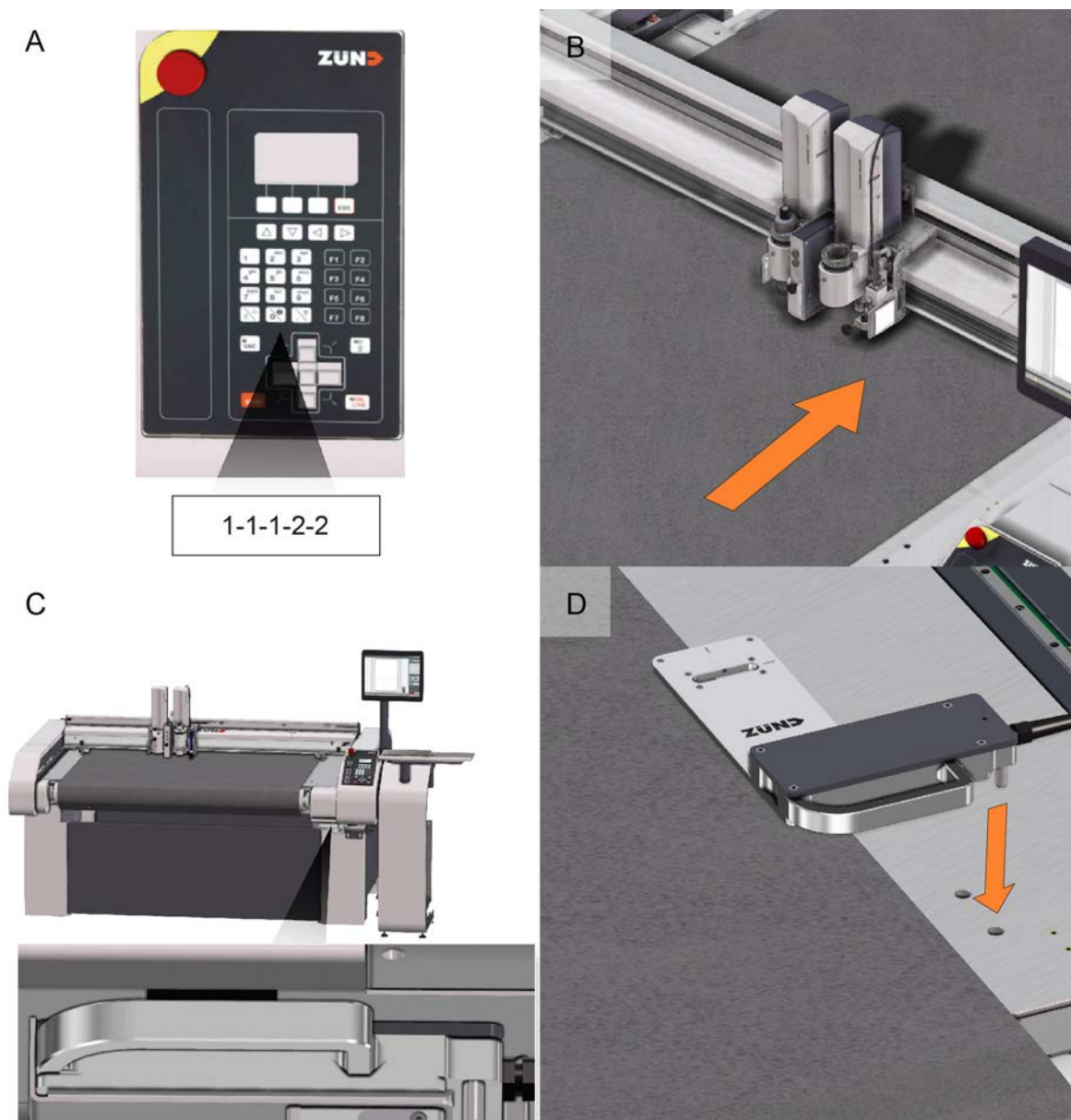


1-1-1-2-6 Test cut

Always perform the test cut with the processing material and the processing parameters of the original job. If the

processing material is not completely cut through, change the **down position**.

4.16.3 Initialization



A Select the function for automatic initialization with **1-1-1-2-2 Auto init**.

B Confirm with **OK**.

The module carriage leaves the AKI area.

C Pull the AKI out of the pickup station.

D Position the AKI in the AKI guide and make sure the AKI rests flat on the work surface.

E Follow the instructions on the cutter control unit.

Results

The tool is positioned via the AKI and the initialization process is started. The tool is initialized at the exact height of the cutting and milling base and the determined value is stored for each specific tool.

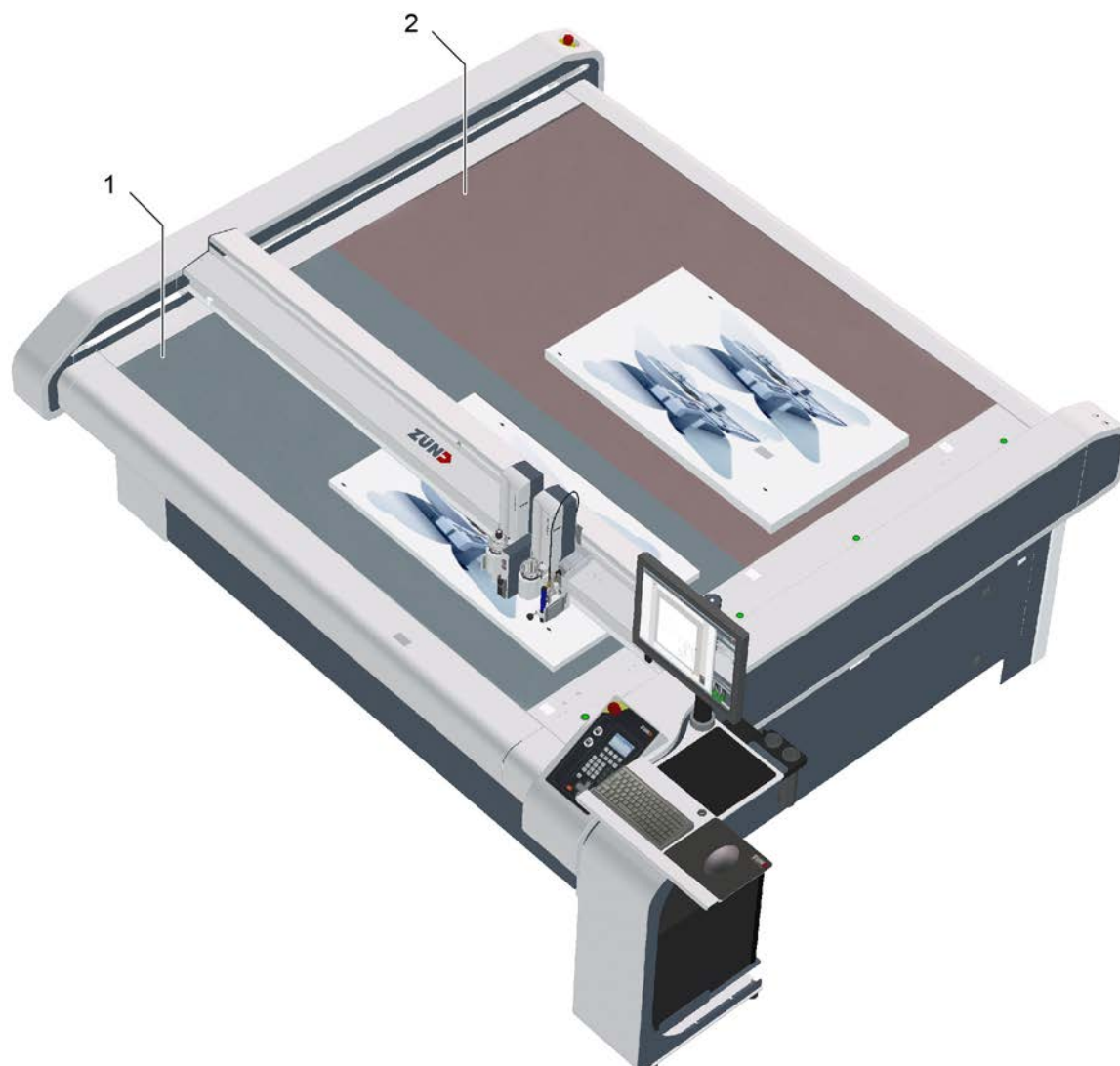
4.17 Job processes

4.17.1 Tandem operation (optional)

Important:

Tandem operation is only available if the cutter is fitted with the tandem vacuum system option.

In addition to the vacuum zones, the vacuum plate is subdivided into two front and rear sections, which act independently of one another.



- 1 Front working area
- 2 Rear workspace

4.17.1.1 Menu settings

Menu	Selection	Function
1-7-8-1 Tandem	Off	No job process selected.
	Tandem operation	Selection of tandem operation job process.
3-1-1 Tandem system		
3-1-1-1 Front status	-	Indicates whether switched off in front working area or whether a vacuum or an air cushion is present.
	-	Switch on the vacuum/air cushion for the front working area.
1-6-1-1-1 Front off	-	Switch off the vacuum/air cushion for the front working area.
1-6-1-1-1 Front vacuum	-	Vacuum pre-selection
1-6-1-1-2 Front air cushion	-	Air cushion pre-selection
3-1-1-4 Rear status	-	Indicates whether switched off in front working area or whether a vacuum or an air cushion is present.
	-	Switch on the vacuum/air cushion for the rear working area.
1-6-1-1-4 Rear off	-	Switch off the vacuum/air cushion for the rear working area.
1-6-1-1-4 Rear vacuum	-	Vacuum pre-selection
1-6-1-1-5 Rear air cushion	-	Air cushion pre-selection

4.17.1.2 Controls, description



- 1 Front working surface
- 2 Center of table
- 3 Rear working area
- 4 Key: rear processing approval
- 5 Key: switch on rear vacuum
- 6 Key: switch on front vacuum

- 7 Key: front processing approval
- 8 Signal: loading/unloading front working area possible/not possible
- 9 Signal: loading/unloading rear working area possible/not possible

Switch vacuum on/off



The key lights up when the vacuum for the working area is switched on.



The vacuum for the working area is switched off.

On the loading/unloading side, the vacuum can be switched on after loading so that the processing material is fixed in place after being placed on the working area. The key lights up when the vacuum is switched on.

Processing approval



The key is lit when the processing approval has been granted. As soon as processing is finished in the other working area, the working surface for which approval has been granted will be processed.



No approval granted.

After loading, press the processing approval key. This indicates to the cutter that the material is correctly positioned and that processing can be started.

Signals, loading/unloading possible



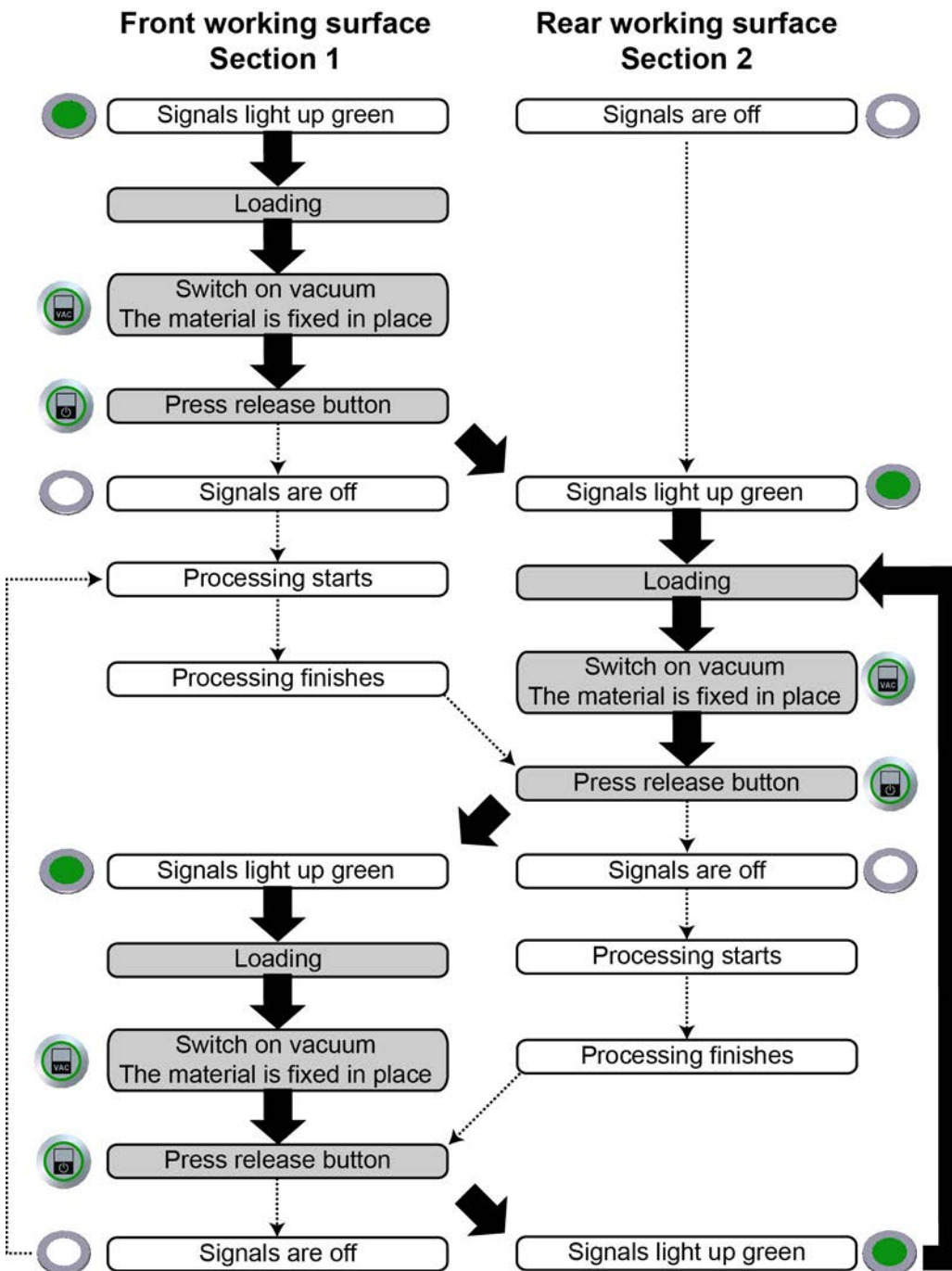
The working area is approved for loading/unloading.



Processing approval has been granted for the working area or processing is currently taking place.

The signals are installed on both working surfaces. When the signals for a working surface light up green, material can be loaded and unloaded on the working surface concerned.

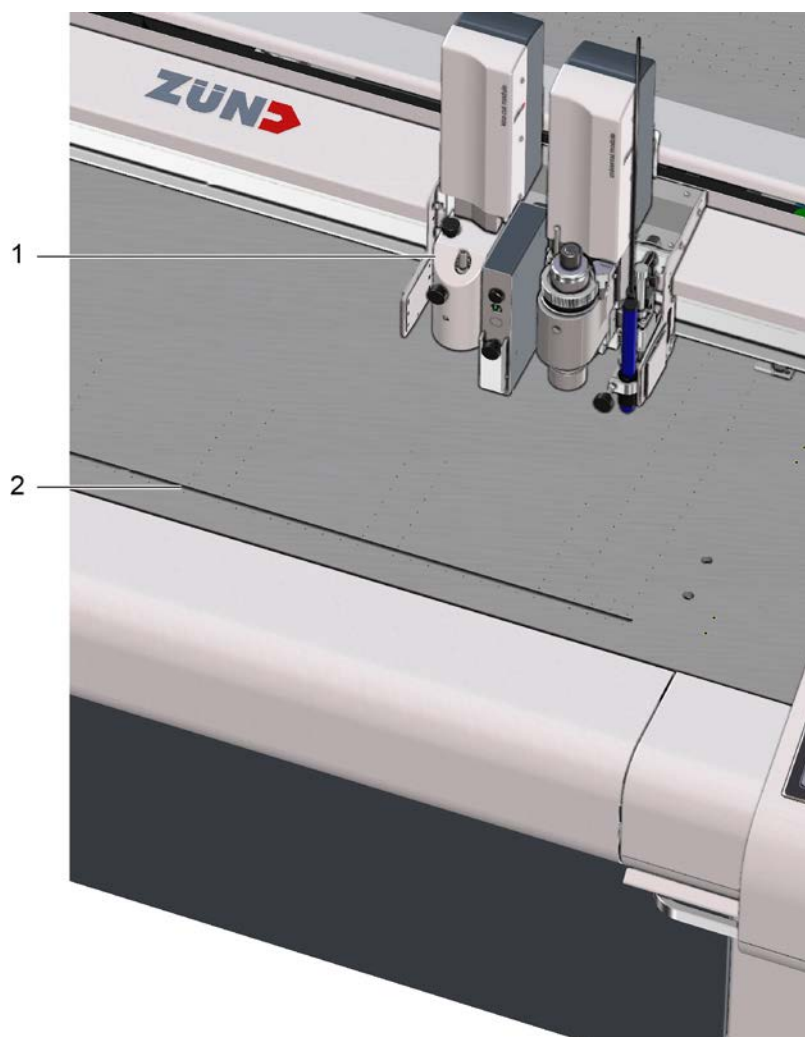
4.17.1.3 Tandem operation



4.18 Film handling

4.18.1 Cutting strips (optional)

Plastic perforated plates for foil applications are fitted with a cutting strip. In combination with a KCM-S, this facilitates the straight cutting of foils without damaging the work surface. In this process, the KCM-S is positioned precisely above the cutting strips and a clean through-cut is made in Position mode.

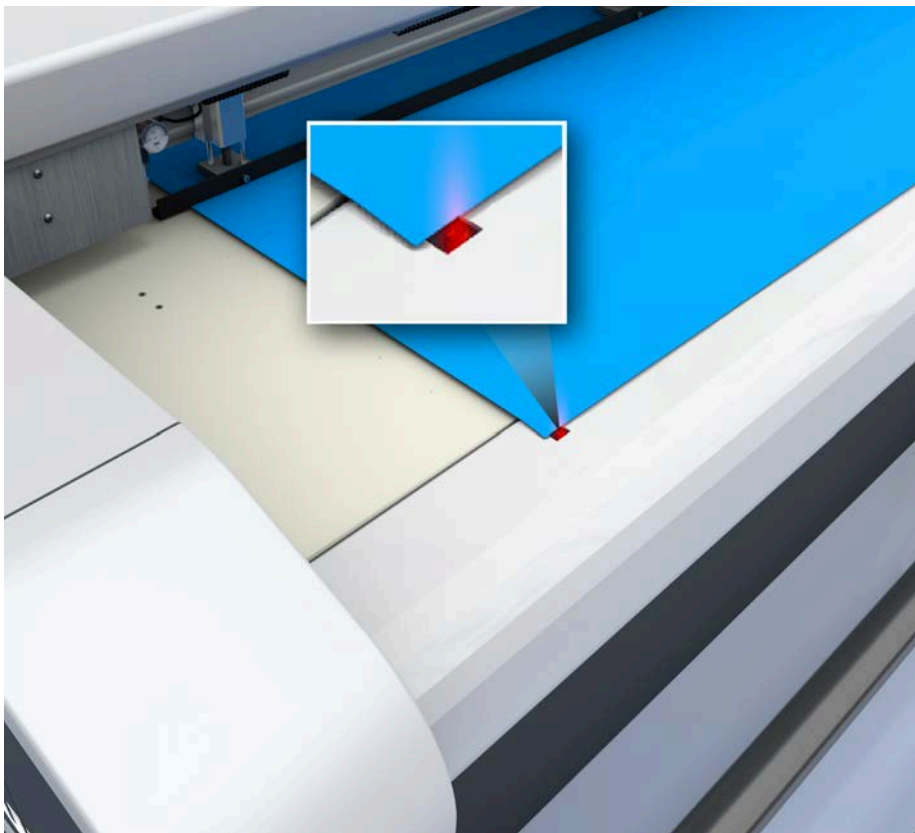


- 1 Kiss-Cut Module - KCM-S
- 2 Cutting strips

Menu	Function
3-6-2 Cut off	The KCM-S is positioned above the cutting strips and a through-cut is performed.
1-7-2-7 Cut, feed	If a KCM-S is installed, this command is used to perform a feed from the current module position up to the cutting strips. This is followed by a through-cut on the cutting strips.

4.18.2 Film end sensor

A film end sensor stops the operation automatically when the material end is reached.



Menu	Function
1-7-1-12-1 Material sensor	Switches the film end sensor on/off
1-7-1-12-2 Status	Displays the status of the film end sensor

4.19 Laser pointer, reference point (optional)

4.19.1 Laser pointer

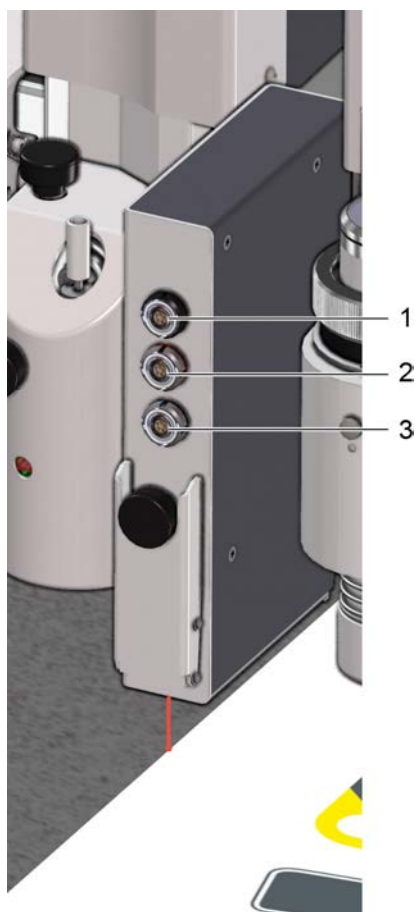


Figure 1: Laser pointer (e.g. ICC camera)

- 1 Connection 1 - port 1¹
- 2 Connection 2 - port 2¹
- 3 Connection 3 - port 3¹

¹See [Connecting powered tools](#).

4.19.2 Pointer selection

Optionally, either the current tool or the laser pointer can be set as the pointer. The position of the pointer is used to define, for example, the reference point or the vacuum width.

A Select the **1-5-2-1-1 Pointer type** function.

B Select the laser pointer or tool.

Results

The pointer is selected and active.

4.19.3 Reference point

A reference point can be defined on the processing surface of the cutter.

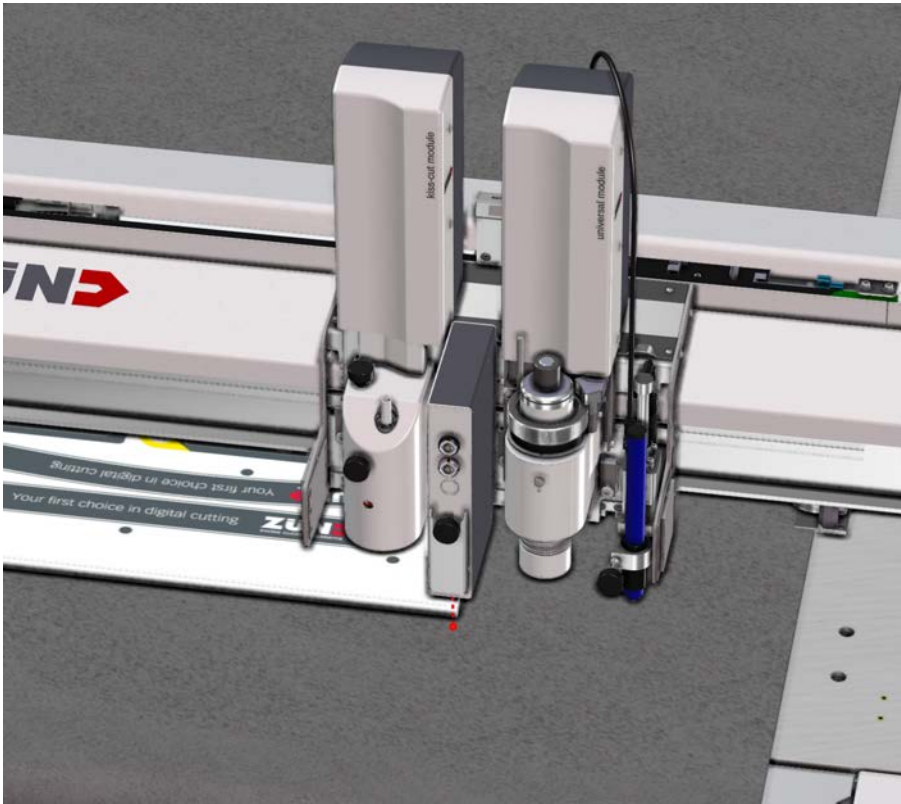
This reference point is the starting point for the processing procedure and corresponds to the zero point of the processing file.



- 1 Reference point
- 2 Zero point X/Y axis, cutter

4.19.3.1 Defining a reference point

For example: active tool = UCT, position: **1-2-1 Tool 2 1**



A Select the **2-1-1-3 Define a reference point** function.

B Use the travel keys to move to the required reference point on the workspace. Press **OK** to confirm.

Results

The reference point is saved for the duration of time that the cutter is switched on. This reference point now applies as the starting point for the processing of material.

4.20 ICC camera, automatic registration (optional)

4.20.1 ICC camera



- 1 Connection 1 - port 1¹
- 2 Connection 2 - port 2¹
- 3 Connection 3 - port 3¹
- 4 Fixing screw
- 5 Stop
- 6 Laser beam exit
- 7 Camera lens

¹See [Connecting powered tools](#) on page 97.

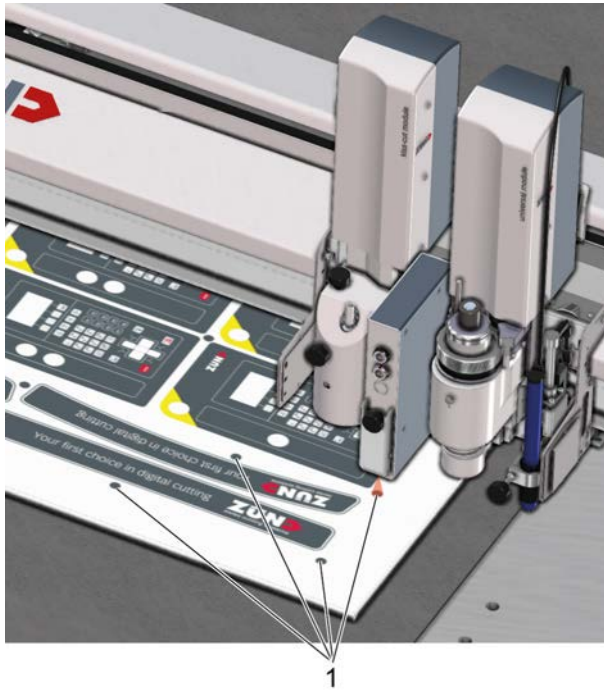
4.20.2 Registration marks

The ICC camera is used to determine the position of printed material on the processing surface using software. The material has the same registration marks as those in the processing file. Recording of the registration marks is software-dependent.



Tip:

When using the ZCC software register, marks with a diameter of 6 - 8 mm 0.2 - 0.3 in are recommended for use.



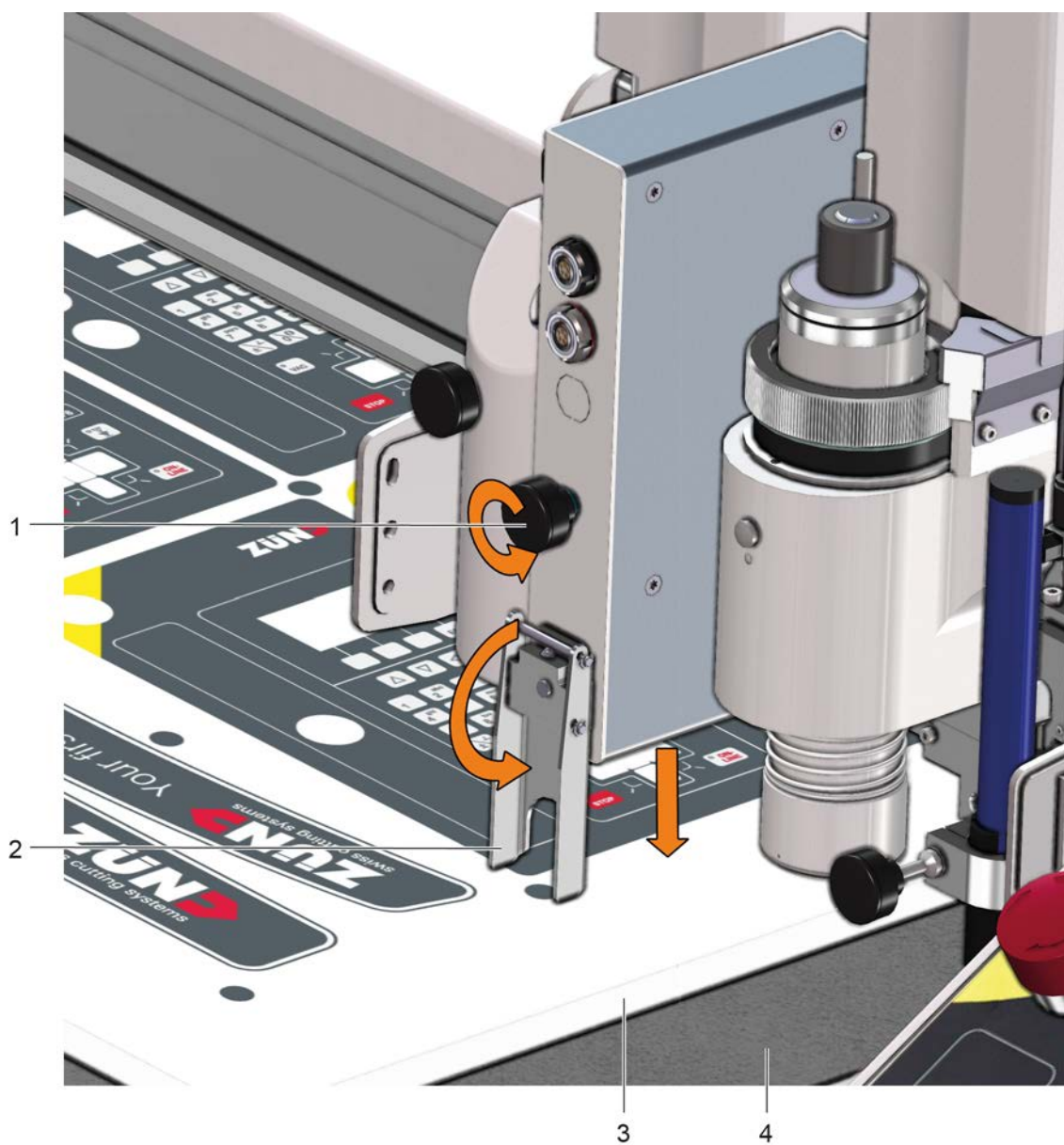
1 Registration marks

Registration mark requirements in case of reflective materials

Color - the image evaluation in the front end software can also use the color to detect the registration mark, along with the shape.

Diameter - So that the reflective camera lens is not detected as a registration mark, the diameter of the registration mark should be selected larger than 17 mm 0.7 in or smaller than 14 mm 0.5 in.

4.20.3 Setting the camera position



- 1 Fixing screw
- 2 Spacer
- 3 Material
- 4 Cutting board

- A** Open the spacer.
- B** Release the fixing screw.
- C** Lower the camera until the stop.
- D** Fasten the fixing screw.
- E** Open the spacer.

4.21 Module carriage slot protective plate



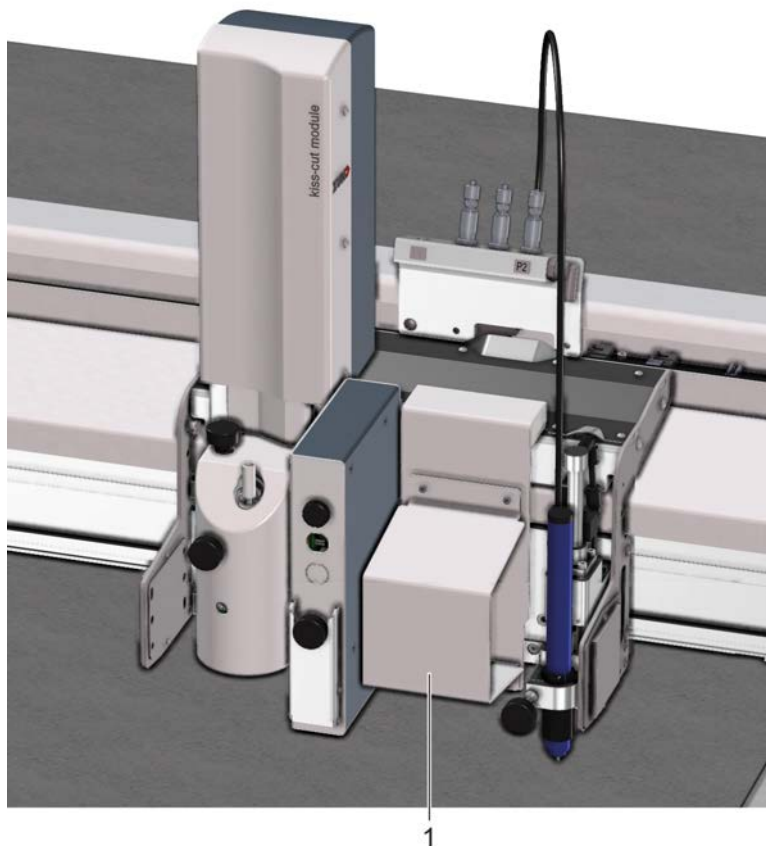
Warning:

Crushing risk!

The module carriage area is not monitored by safety devices.

- Do not reach into the active area of the cutter during operation.
- Protect non-occupied slots with slot protective plates.

On the one hand, the slot protective plate is used as a safety device, and on the other it is used to protect a free module slot from contamination.



1 Protective slot plate

4.22 Signal lights (optional)

Signal lights are used to visually indicate the cutter's operating status, warnings and any errors.



Signal color	Operating state/meaning/effect	
Red	STOPPED	Cutter stops
	Error	
Yellow	OFFLINE	Cutter stops
	Warning	Machining continues; a warning appears on the operating unit
Green	ONLINE	-
Blue	<ul style="list-style-type: none"> User action required on control panel. User action in Zünd Cut Center required. 	

5 Tips for cutting

Efficiency and production quality can be affected by many factors. If you are not satisfied with the quality of your job, the following questions can help:

- 1 Can the tool used cut the material?
- 2 Can the blade used cut the material?
- 3 Is the blade of high quality?
- 4 Have the cutting data been processed in a way appropriate for the cutter?
- 5 Have settings such as speed or acceleration been selected correctly in relation to the processing method and processing material?
- 6 Is the material adequately fixed, are the vacuum settings correct?



Tip:

Contact your Zünd partner or the Zünd customer information centre for further information.

5.1 Select tool



Tip:

Zünd recommends using Zünd Cut Center - ZCC as the processing software. The ZCC material database contains a multitude of materials, the optimum processing methods and the processing parameter required for it.

Each material possesses specific properties that have to be observed during processing. The Zünd modular tool concept offers the right processing method for every material:

- Processing with drag knives (UCT, SCT, VCT, PPT, KCT)
- Oscillating cutting (EOT, EOT-250, POT)
- Processing with rotary knives (DRT, WKT)
- Routing (URT, RM-S)

5.2 Selecting a blade

5.2.1 Knife types

Depending on which tool the knife is used in, a distinction is made between the following knife types:

- **Drag knife:** this knife is used in non-powered tools such as UCT, VCT, SCT, PPT, KCT, KCM-S
- **Oscillating knife:** used in EOT, EOT-250, POT oscillating tools
- **Rotary knife:** decagonal (ten-sided) blades for DRT tools
- **Circular knife:** used in WKT tool

5.2.1.1 Oscillating knife

The oscillating tool is mostly recommended for cutting thick and tough materials. The oscillating motion of the blade decreases the drag force exerted on the material in the direction of travel. However, to achieve this, the feed speed must be precisely adjusted to suit the blade geometry and the oscillation frequency of the tool used. Choosing the right oscillating knife depends primarily on the processing contour to be cut:

- Zünd recommends flat blades for large radii, straight and large parts.
- Very sharp, pointed blades should only be used to cut small radii. The feed speed must be reduced to achieve a good quality cut!

Flat knife (e.g., Z43)



- High processing speed
- Large radii, straight or large parts

Pointed knife (e.g., Z20)



- Low processing speed
- Small radii or small parts

5.2.1.2 Drag knife

Drag knives are used in combination with non-powered tools (UCT, SCT, PPT, VCT, KCT,...).

- Maximum processing speed
- Cheap to purchase and maintain
- High cutting force
- Particularly suitable for foils, paper, thin folding carton, banners, etc.
- Most cost-effective processing variant, as the purchase price for the required tools is significantly lower compared to powered tools.

Round-shaft knife (e.g., Z1)



Flat-shaft knife (e.g., Z10)



Passepartout knife (e.g., Z34)



V-cut knife (e.g., Z70)



5.2.1.3 Circular knife

Circular knife (e.g. Z55)



- Very high processing speed
- Suitable for large radii, straight or large parts
- Recommended for breathable materials such as textiles, carbon fiber, glass fiber, etc.
- Very large overcut
- Only use with special PU cutting board.

5.2.1.4 Rotary knife

Decagonal (ten-sided) knife (e.g., Z50)



- Very high processing speed
- Suitable for large radii, straight or large parts
- Recommended for breathable materials such as textiles, carbon fiber, glass fiber, etc.
- Very large overcut

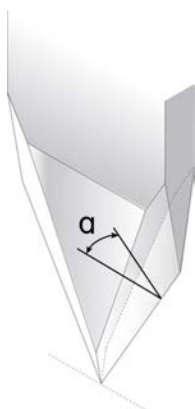
5.2.2 Knife types

Depending on which tool the knife is used in, a distinction is made between the following knife types:

- **Drag knife:** this knife is used in non-powered tools such as UCT, VCT, SCT, PPT, KCT, KCM-S
- **Oscillating knife:** used in EOT, EOT-250, POT oscillating tools
- **Rotary knife:** decagonal (ten-sided) blades for DRT, PRT tools
- **Circular knife:** used in WKT tool

5.2.3 Blade geometry

5.2.3.1 Wedge angle



The wedge angle determines the sharpness of the blade. In theory, a very narrow wedge angle means a very sharp blade that exerts very little drag force on the material. However, a narrow wedge angle also results in considerable force being exerted on the blade. The narrower the wedge angle, the more unstable the blade becomes. For this reason, the wedge angle is always a compromise between sharpness and stability. Zünd blades are specifically designed and sharpened to handle a wide range of materials. The additional specifications provided for each blade contain a list of the materials for which it can be used.

5.2.3.2 Cutting angle

The cutting angle has a major effect on the cutting force. With drag knives, a narrow cutting angle means smaller drag forces. However, this has the disadvantage of creating a larger overcut.

Drag knife



Oscillating knife, flat

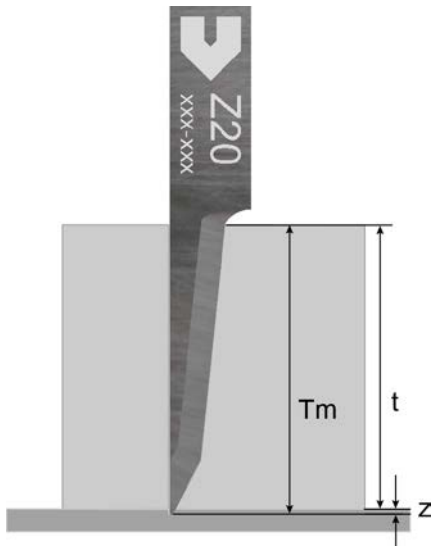


Oscillating knife, pointed



5.2.3.3 Maximum cutting depth

There is a specified maximum cutting depth for each blade, which is determined by the length of the cutting edge. The cutting depth which can be achieved depends greatly on the type of material. The cutting depth of some oscillating blades will be reduced when using the spring-loaded glide shoe. Please remember to factor in the set depth as well as the material thickness.



T Material thickness

Z Set depth

TM Cutting depth = material thickness t + set depth z

5.2.3.4 Overcut

The pre-cut x_1 is the distance from the centre of the axis of rotation to the first point where the cutting edge cuts the material surface in the direction of travel. The post-cut x_2 is the measurement from the centre of the axis of rotation to the last point where the cutting edge cuts the material surface.

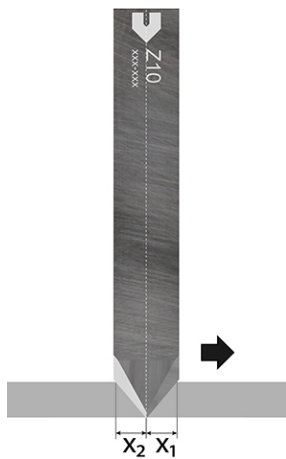
The cutting angle has the greatest influence on processing quality. A narrower cutting angle may enable a faster processing speed, but it also produces a greater overcut. A narrower cutting angle can be used for paths that include large curves and long straight sections.



Tip:

The overcut distorts the cutting paths. For cuts with a low margin of error, Zünd recommends choosing a knife with a lower overcut. Overcut information can be found in the additional specifications for each knife.

Drag knife



Oscillating knife, flat



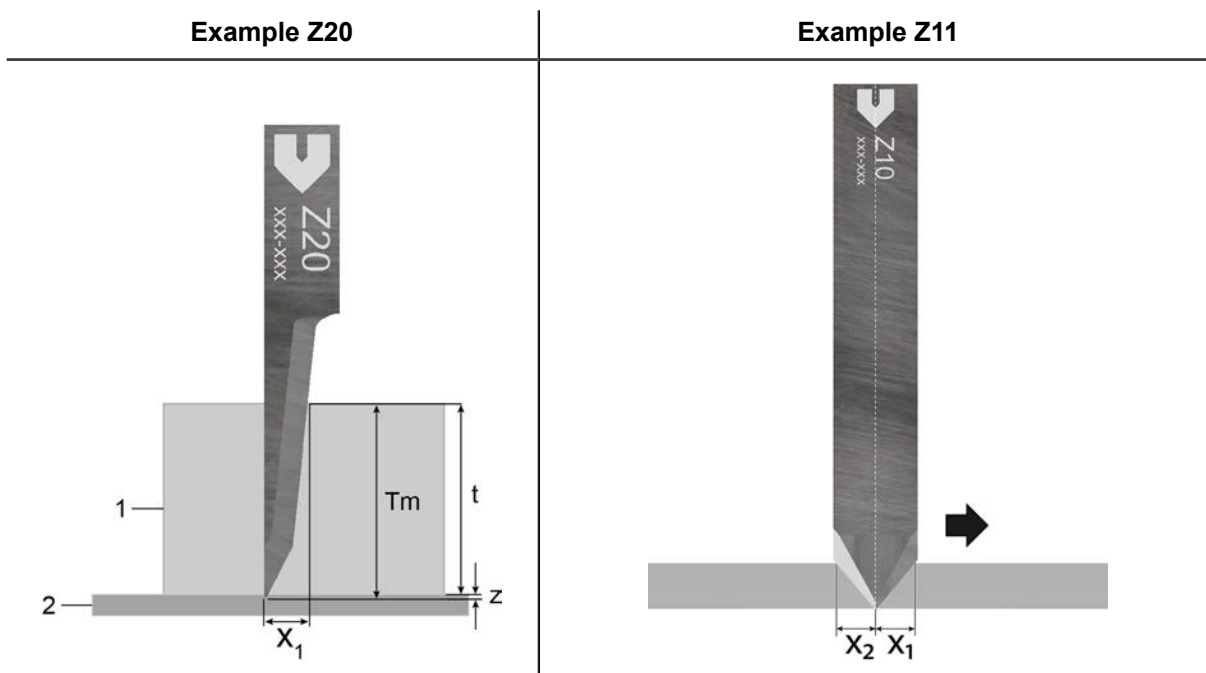
Oscillating knife, pointed



5.2.3.4.1 Calculating the overcut

Depending on the cutting depth, the blade geometry will produce a different level of overcut. This chapter explains how to calculate your overcut based on the blade you are using and the material you are cutting. The Z20 pointed oscillating knife and Z11 drag knife are used as examples here.

The cutting depth TM is made up of the material thickness t and the set depth z . Insert these values into the formula as they are listed in the product description for each blade. The result will be the pre-cut/post-cut in mm.



- 1 Material
- 2 Cutting board
- T Material thickness
- Z Set depth
- TM Cutting depth = material thickness t + set depth z
- x₁ Pre-cut
- x₂ Post-cut

	Sample calculation Z20	Sample calculation Z11
Formula	$x = 1.2 + 0.11 \times TM$	$x_{1,2} = 0.58 \times TM$
Cutting depth	TM = 10.2 mm	TM = 5.2 mm
Pre-cut	x ₁ = 2,322 mm	x ₁ = 3,016 mm
Post-cut		x ₂ = 3,016 mm

5.3 Preparing cutting data



Tip:

Zünd recommends using Zünd Cut Center - ZCC as the processing software. The data are optimally prepared for the requirements of Zünd cutters.

If the front end software sends the curves to the cutter in the form of arc functions, the cutter control unit generates the resolution automatically according to the quality level set. This helps the user to adjust the cutter and leads to high quality processing results.

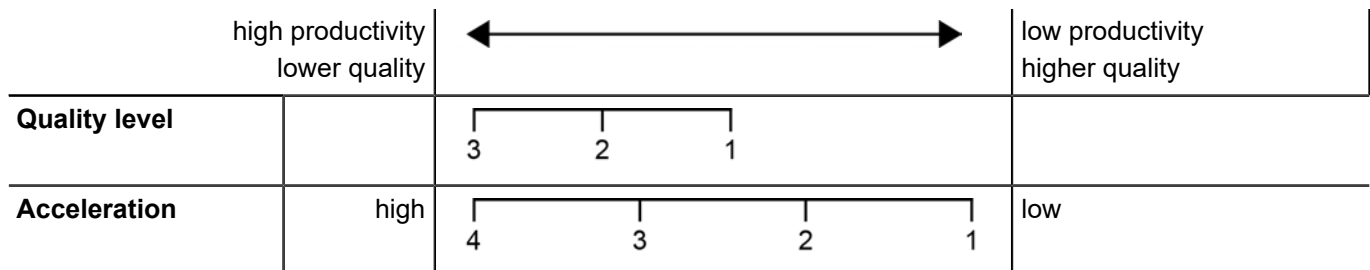
5.4 Settings, speed, quality

The output of the cutter and the quality of the cutting result are effected by the acceleration, quality, and speed selected.

5.4.1 Quality and acceleration

Above all, the output quality is defined by the quality and acceleration settings.

- If a high quality is required, it is recommended to select quality level 1 (high). If the result is still not satisfactory, the acceleration can additionally still be reduced from 4 to 3, 2, or 1.
- If the quality is less important, then quality level 3 (low) and acceleration 4 (max.) can be selected (in favor of maximum productivity).
- By default, quality level 2 (normal) and acceleration 4 are set. In most cases, this provides good quality with high productivity.



5.4.2 Speed

The speed only has a limited effect on the quality of the cutting result. That is why it should be limited only if the cutting or routing process requires it.

The maximum speed that can be reached depends on the cutting contour. High speeds can only be reached in sufficiently long straight sections or sufficiently wide radii. If the cutting or routing process allows it, it is recommended to leave the maximum speed at 1 m/s.

If the cutting process requires a very low speed and the radii are not too tight, a reduction of the speed is recommended.

Recommended acceleration level depending on the speed

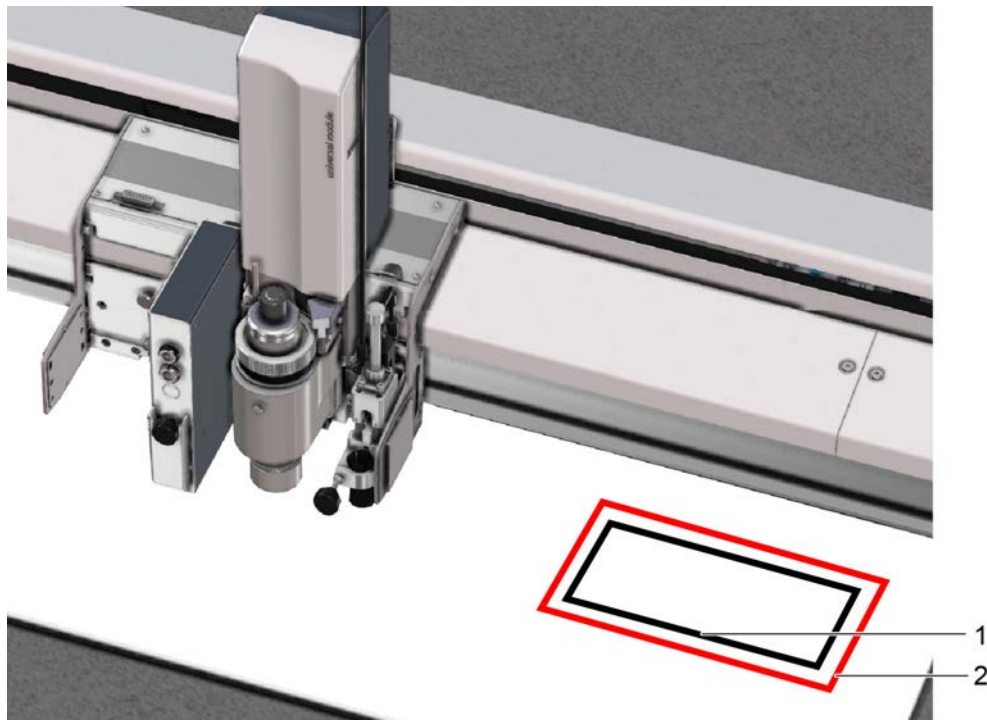
Speed [mm/s]	Acceleration level
10	1
20	1
40	2
80	3
> 160	4

5.5 Recognising processing errors

5.5.1 Blade clamped at an angle

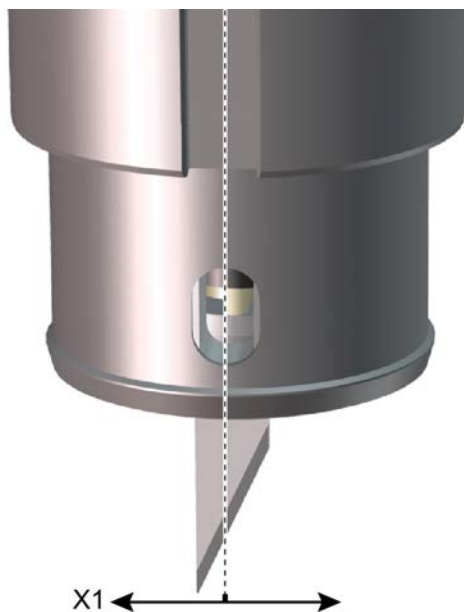


If the blade does not lie exactly at the zero point, a cut is produced that runs parallel to the original cutting path.



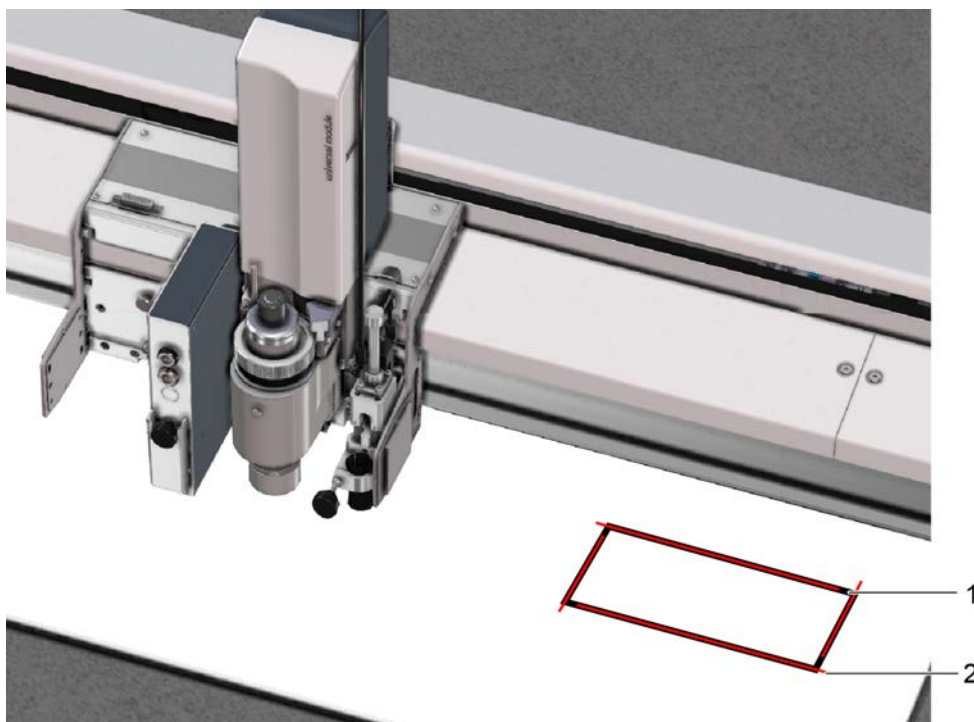
- 1 Contour as per processing file
- 2 Effectively cut contour due to blade clamped at an angle
- Y1 Deviation of the blade to zero point

5.5.2 Blade displaced from turning center



If the blade tip is not positioned in the turning centre of the tool, the rotational axis of the blade will be displaced. This results in the following quality defects:

- The start and end point of the cutting path do not match up
- Curves are cut inaccurately



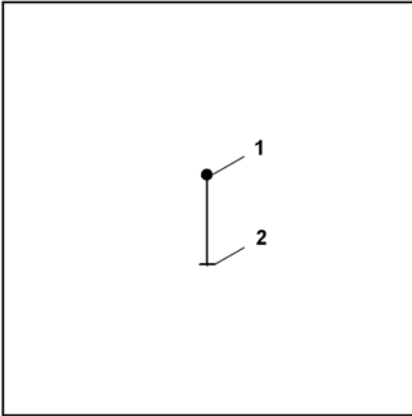
- 1 Contour as per processing file
- 2 Effectively cut contour due to blade displaced from the turning center
- X1 Deviation of the blade to the turning center

5.5.3 XY correction

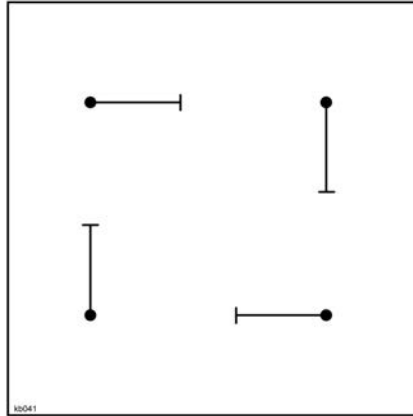
Slight inaccuracies when clamping the blade can be corrected using the XY correction.

Correction values, general

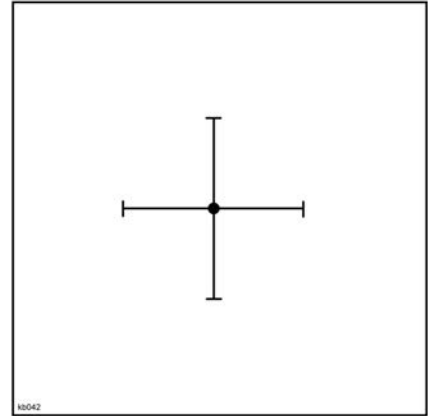
The penetration point and/or the cut direction of each test cut act as measuring points for the calculation of the correction values. You should therefore observe exactly where the blade penetrates when cutting the 4 lines and mark the penetration points.



1 Start of cut (penetration point)
2 End of cut



Cutting diagram with all correction values set to 0.

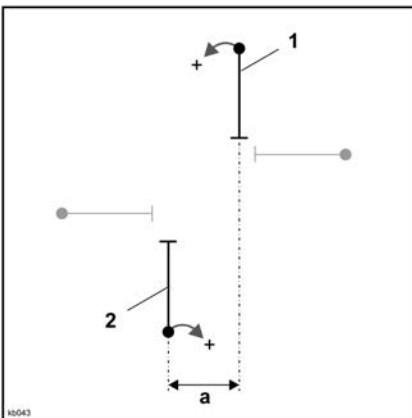


Cutting diagram once the alignment process has been successfully completed.

Y correction — correcting contour error caused by blade clamped at an angle

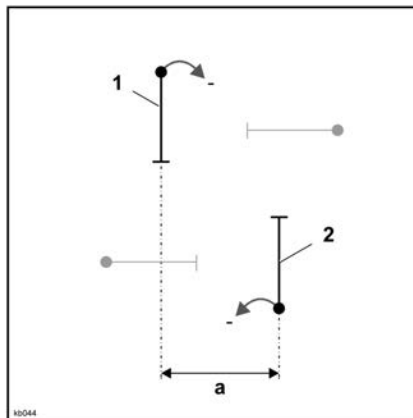
During Y correction, the cuts are moved until the respective parallel cuts are on one line.

- Start the **1-1-1-4-5 Test cut** function
- Measure distance a (mm/in) of the parallel cuts and calculate as follows:



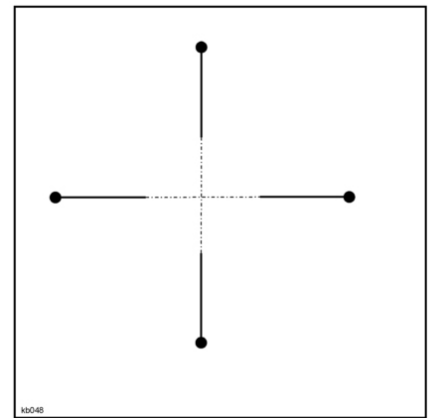
Option 1: Line 1 has to be moved to the left and/or line 2 has to be moved to the right to lie along the same line.

$$Y = \text{existing Y correction value} - a/2$$



Option 2: Line 1 has to be moved to the right or line 2 has to be moved to the left to lie along the same line.

$$Y = \text{existing Y-correction value} + a/2$$



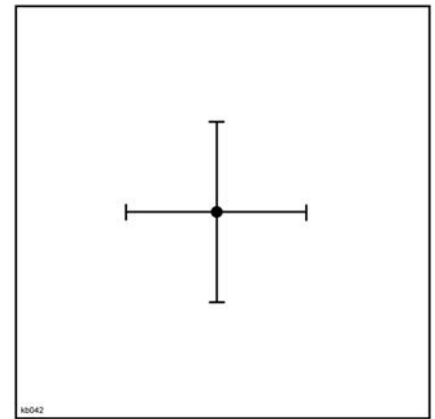
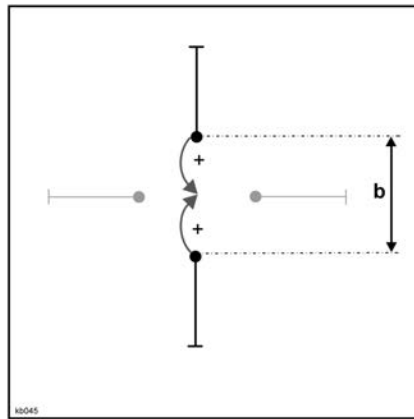
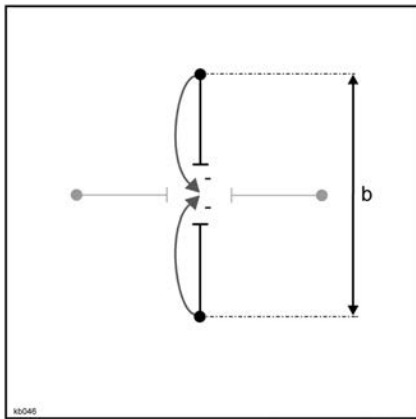
Result: The cuts are along one line.

- Enter the calculated value **Y** in the field **1-1-1-4-3 Correct Y**
- Perform a test cut and recalculate the correction value, if necessary.
- The Y-correction is complete when the cuts are on the same line (tolerance: ± 0.1 mm). Where necessary, check this using a magnifying glass.

X-correction — correcting contour error caused by displaced blade

During the X correction, the cuts are moved until each penetration point is exactly in the center.

- Start the **1-1-1-4-5 Test cut** function
- Measure distance **b** (mm/in) (penetration point line 1 to penetration point line 2) of the opposite cuts and calculate as follows:



Option 1: The distance between the penetration points is greater than the distance between the ends of the cuts

$$X = \text{existing X correction value} - b/2$$

Option 2: The distance between the penetration points is smaller than the distance between the ends of the cuts

$$X = \text{existing X correction value} + b/2$$

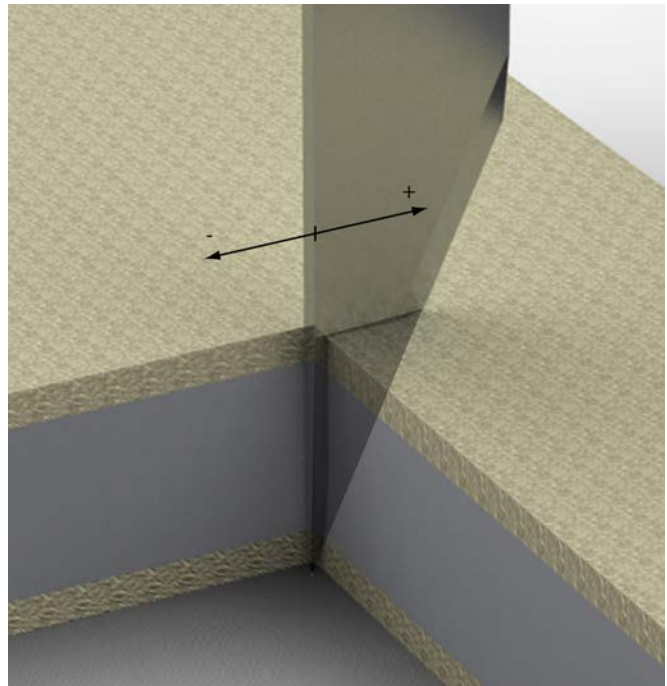
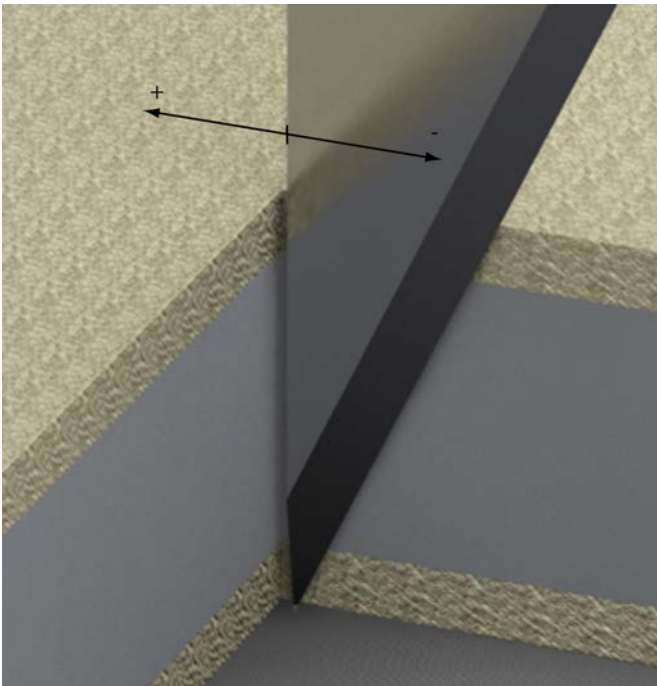
Result: The penetration points are precisely in the center.

- Enter the calculated value **X** in the field **1-1-1-4-2 Correct X**
- Perform a test cut and recalculate the correction value, if necessary.
- The X-correction is complete as soon as each penetration point is precisely in the center (tolerance: ± 0.1 mm). Where necessary, check this using a magnifying glass.

5.5.4 Correcting the overcut

Overcut distance at penetration point

Overcut distance at the end point

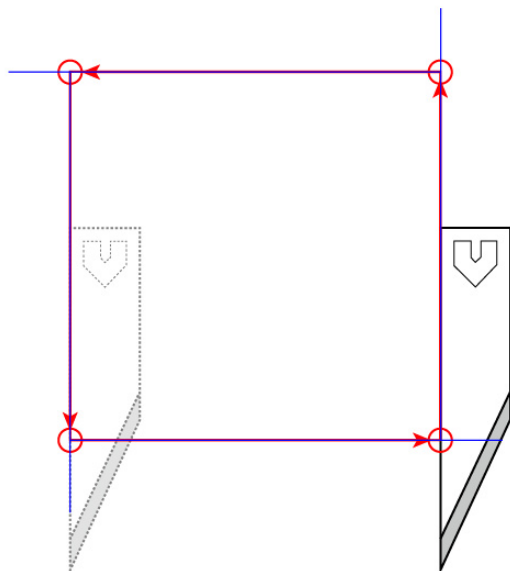


An overcut is usually generated at the penetration point when blades have two cutting edges (e.g. Z11). This can be avoided by using blades with only one cutting edge.

At the tip of the blade, the end point of the straight lines corresponds to the target cutting outline. The shape and dimensions of the blade lead to an overcut on the material top side.

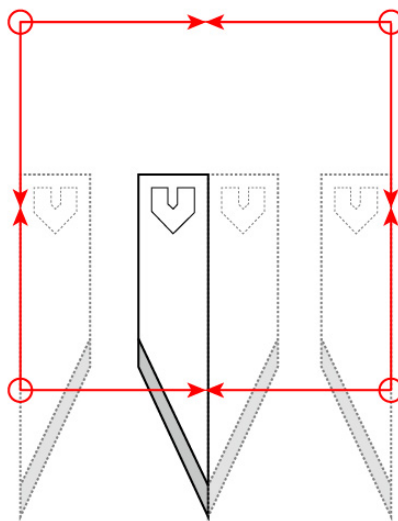
5.5.5 Cutting from 2 sides

Overcut



Cutting of corners with overcut.

Optimized



An overcut can be avoided if the cutting path is divided and cutting is carried out from 2 sides. The disadvantage is a longer production time.

5.5.6 Contour error due to overcut on rounded parts

Problem

Underside



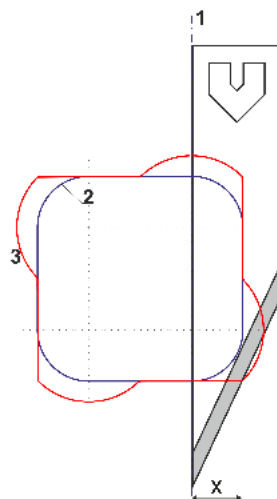
The contour cut on the underside of the material corresponds to the desired contour as per the processing file.

Top side



The contour cut on the top side of the material contains the contour error resulting from the overcut.

Schematic representation



- 1 Rotational axis of the tool
- 2 Desired contour = contour cut on the underside
- 3 Contour cut on the top side with contour error
- X...overcut

Solution

- Use the X-correction to move the rotational axis of the tool and make a compromise between the top side and underside.
- However, moving the rotational axis of the tool will also change the start and end point of the cutting path.
- X correction = $x/2$

Underside

$x = 4 \text{ mm}$, X correction = 2 mm



The contour cut on the underside of the material has a low margin of error

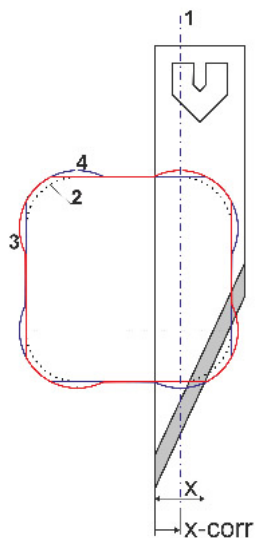
Top side

$x = 4 \text{ mm}$, X correction = 2 mm



The contour cut on the top side of the material has a low margin of error

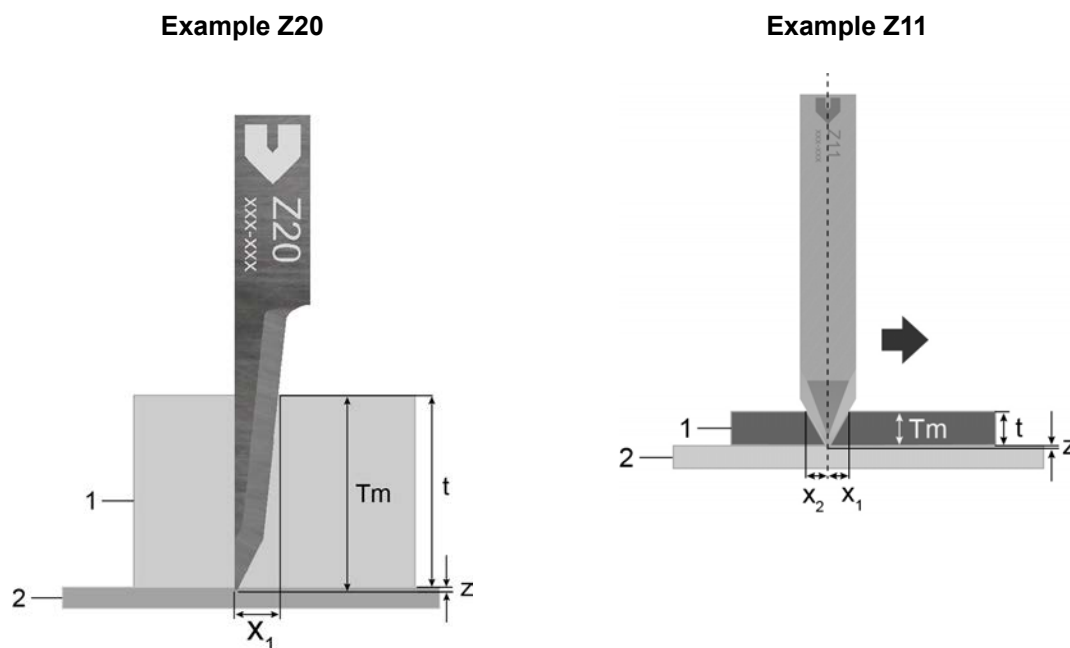
Schematic representation



- 1 Rotational axis of the tool offset by the X correction
 - 2 Desired contour
 - 3 Contour cut on the top side with contour error
 - 4 Contour cut on the underside with contour error
- X...overcut

Calculating the overcut

Depending on the cutting depth, the blade geometry will produce a different level of overcut. When undercuts are created, a distinction is made between pre-cut x_1 and post-cut x_2 . The pre-cut x_1 is the distance from the centre of the axis of rotation to the first point where the cutting edge cuts the material surface in the direction of travel. The post-cut x_2 is the measurement from the centre of the axis of rotation to the last point where the cutting edge cuts the material surface. The Z20 pointed oscillating knife and Z11 drag knife are used as examples to illustrate how to calculate the overcut based on the blade you are using and the material you are cutting.



- 1 Material
- 2 Cutting board
- T Material thickness
- Z Set depth
- TM Cutting depth = material thickness t + set depth z
- x_1 Pre-cut
- x_2 Post-cut

The cutting depth TM is made up of the material thickness t and the set depth z. Insert these values into the formula as they are listed in the product description for each blade. The result will be the pre-cut/post-cut in mm.

Sample calculation Z20

Formula $x = 1.2 + 0.11 \times TM$

Cutting depth $TM = 10.2 \text{ mm}$

Pre-cut $x_1 = 2,322 \text{ mm}$

Sample calculation Z11

Formula $x_{1,2} = 0.58 \times TM$

Cutting depth $TM = 5.2 \text{ mm}$

Pre-cut $x_1 = 3,016 \text{ mm}$

Post-cut $x_2 = 3,016 \text{ mm}$

Performing X-correction with X/2

Only perform the X correction with the value X/2 after the XY correction has already been performed once. Open

- **1-1-1-4-2 Correct X.**
- Enter the existing value and the calculated value **X/2** in the field **1-1-1-4-2 Correct X**
- Perform a **1-1-1-4-5 Test cut** and recalculate the correction value, if necessary

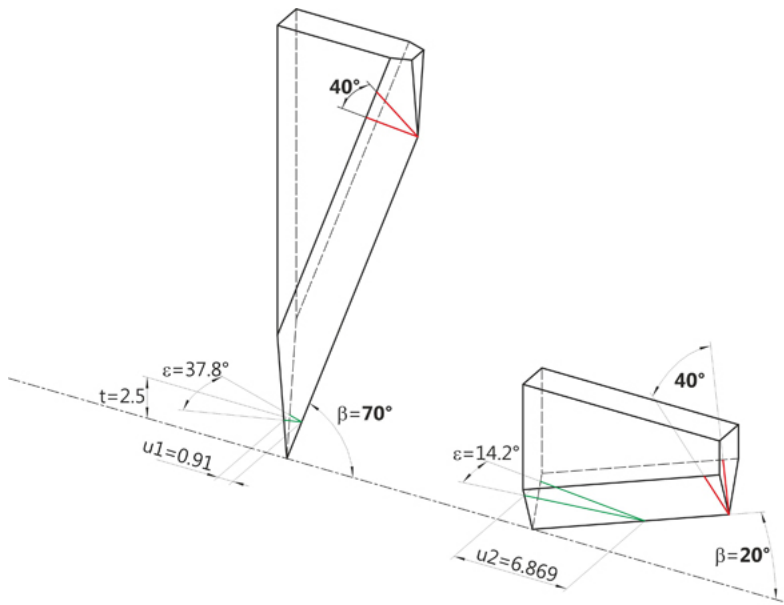
5.6 Oscillating cutting



Tip:

Oscillating cutting offer the following advantages:

- The main cutting direction is vertical as opposed to horizontal.
- The horizontal cutting forces are reduced.



5.6.1 Comparison of EOT/POT specifications

Tool	Stroke A [mm]	Frequency f [Hz]	Stroke speed z_v [m/s]
EOT 0.5	0.5	300	0.471 (sine motion)
EOT 1.0	1.0	300	0.943 (sine motion)
EOT-250	2.5	250	1.963 (sine motion)
POT	8.0*	180	2.880 (sawtooth curve)

* Stroke and frequency decrease with increasing load.



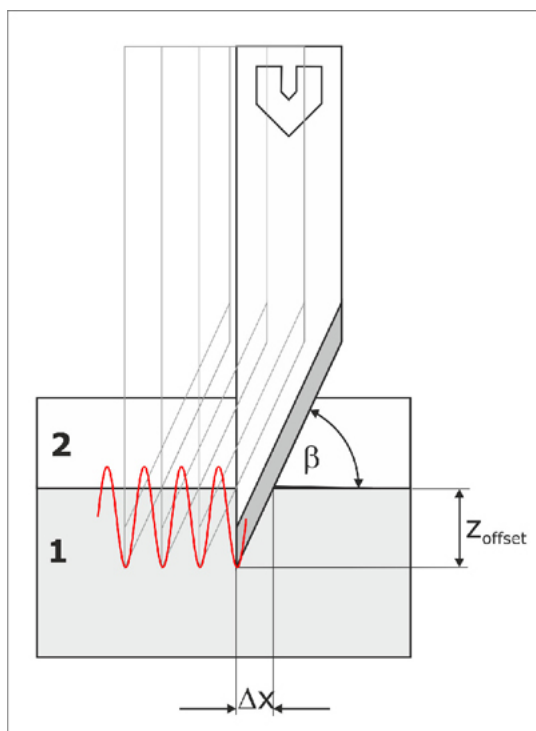
Tip:

Note the following when selecting the tool:

- The higher the frequency, the higher the cutting speed as a function of the perforation of the material.
- The higher the stroke speed, the higher the cutting speed.

5.6.2 Calculation of maximum speed for EOT / POT

Z16



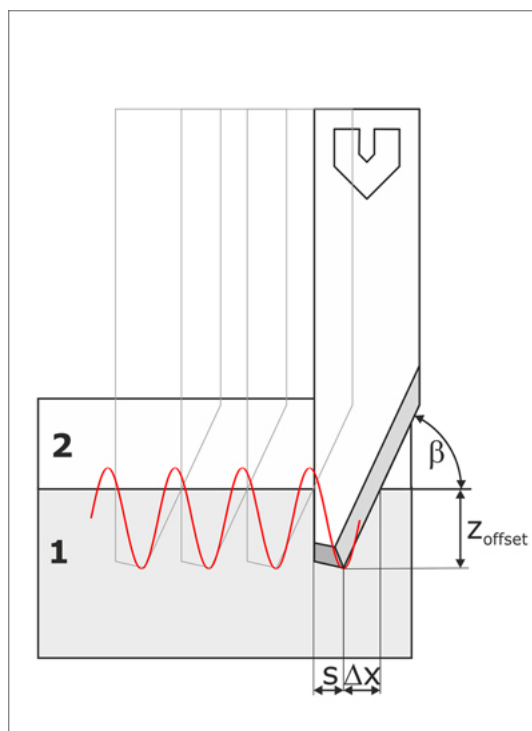
$$v = \Delta X \times f$$

$$v = \frac{Z_{\text{offset}}}{\tan(\beta)} \times f$$

Example:
 $\beta = 55^\circ$
 $f = 300 \text{ Hz}$
 $\text{zoffset} = 0.8 \text{ mm}$

$$v = \frac{0.8}{\tan(55^\circ)} \times 300 = 168 \frac{\text{mm}}{\text{s}}$$

Z42



$$v = (\Delta X + s) \times f$$

$$v = \left(\frac{Z_{\text{offset}}}{\tan(\beta)} + s \right) \times f$$

Example:
 $\beta = 55^\circ$
 $f = 300 \text{ Hz}$
 $\text{zoffset} = 0.8 \text{ mm}$
 $S = 0.8 \text{ mm}$

$$v = \left(\frac{0.8}{\tan(55^\circ)} + 0.8 \right) \times 300 = 408 \frac{\text{mm}}{\text{s}}$$

5.7 Tips for increasing the rate of production

For high production speeds with good quality, Zünd recommends the following method:

- Set the holding times for the tool (Before Down, After Down, Before Up, After Up) to 0 ms. This is usually necessary for tools with a pneumatic Z-axis.
- To raise the tool, set the maximum values for the speed and acceleration parameters.
- To lower the tool, set the maximum values for acceleration or speed.

5.8 Identifying and rectifying quality problems

Curves cut inaccurately

Acceleration/speed is too high.	Reduce acceleration/speed.	1-1-1-3-2 Speed
Processing data are of poor quality.	Revise the processing data. Send curves to the cutter as arc functions.	-
Wrong blade in relation to material type, material thickness, or cutting contour.	Select a blade which is appropriate to the material, material thickness and cutting contour. For help with selecting the right one, refer to the Zünd accessories catalog.	-

Cutting distortion of curves due to blade overcut

Due to the geometry, the blade produces a large overcut	Select a blade which is appropriate to the material, material thickness and cutting contour. For help with selecting the right one, refer to the Zünd accessories catalog.	-
The overcut correction is not set.	Set the overcut correction. Enter overcut/2 as correction value.	1-1-1-4-2 Correct X

Jerky, stuttering cutter movement

Processing data are of poor quality.	Revise the processing data. Send curves to the cutter as arc functions.	-
The acceleration is too high	Reduce the acceleration	1-1-1-3-3 Acceleration
The vector intermediate angle, for which the speed is reduced to zero if this angle is exceeded, has been set too small.	Check the stop angle (may be too small – enlarge) adjust vectors.	

Material accumulation in corners

The angle from which the tool is raised during change of direction is set too high. As a result the change of direction is performed in the material.	Check setting of lift-up angle (may be too large – reduce)	1-1-1-3-5-1 Auto lift-up angle
---	--	---------------------------------------

Poor quality cutting edges

Wrong tool is used to process the material	Select a different tool. It is often a good idea to use an oscillating tool (EOT or POT).	-
Worn blade	Insert new blade. Ordering information can be found in the Zünd accessories catalog.	-
The processing speed is too fast.	Reduction of the processing speed.	1-1-1-3-2 Speed

Material cover layer is damaged

Wrong tool is used to process the material	Select a different tool. It is often a good idea to use an oscillating tool (EOT or POT).	-
Worn blade	Insert new blade. Ordering information can be found in the Zünd accessories catalog.	-
The processing speed is too fast.	Reduction of the processing speed.	1-1-1-3-2 Speed

Material is perforated.

Wrong blade used in relation to the speed requirement (pointed instead of flat horizontal blade).	Select a blade which is appropriate to the material, material thickness and cutting contour. For help with selecting the right one, refer to the Zünd accessories catalog.	-
The processing speed is too fast.	Reduction of the feed speed.	1-1-1-3-2 Speed
Set depth too low	Set greater set depth	1-1-1-2-7 Z-offset
"continuous path" set incorrectly. Prescribed maximum speed exceeded.	Switch on "continuous path"	1-1-1-3-1-6 Continuous Path

Dimensional stability is wrong

Blade incorrectly clamped.	Check the mechanical blade position.	-
Zoom factor is not "1"	Set zoom factor X to "1"	2-2-1 X scale

	Set zoom factor Y to "1"	2-2-2 Y scale
--	--------------------------	----------------------

General quality problems

<p>The processing data sent to the cutter are erroneous.</p>	<p>Prepare the data better in the front end software and send the circle data as an arc function. Define the acceleration and the circle resolution in the cutter quality settings:</p> <ul style="list-style-type: none"> • High: average acceleration, high quality • Normal: average acceleration, average quality • Low: high acceleration, average quality 	<p>1-1-1-3-1-9 Quality</p>
<p>Material hold-down is insufficient.</p>	<ul style="list-style-type: none"> • Set the vacuum range to the material size • Cover open vacuum areas • Increase the vacuum strength (can only be regulated for turbines) • Ensure that the material is even on the working surface • Additionally cover extremely air-permeable materials with vinyl 	<p>1-8 Hold down functions 3-1 Fixing</p>

6 Maintenance

This chapter contains information on the following:

- Safe maintenance of the machine
- Using operating resources
- Maintenance work and maintenance intervals
- Instructions for disposal
- Starting up after periods of standstill

The maintenance list takes into account the cutter (base machine). Maintenance activities for modules, tool inserts and options are found in the respective operating instructions.

Maintenance recommendation

Regular maintenance extends the lifetime of the cutter. Zünd Systemtechnik also recommends an **annual general inspection** of the cutter with follow-up maintenance as needed. Depending on the operating conditions, it may be advisable to reduce the interval.

To enable a swift general inspection, please have the accessory box ready for the service technician.

Decommissioning/extended downtimes and recommissioning

If the cutter is to be shut down or put out of operation for a long period, the modules should be removed from the module carriage and the cutter should be preserved. Please contact your customer service representative to arrange for the preservation of the machine or to put the machine back into operation.

Qualification

Authorized service technician: Personnel authorized by Zünd Systemtechnik, their customer service or contractual partners authorized by Zünd Systemtechnik.

Instructed operating personnel: Personnel of the operator instructed in maintenance by an authorized service technician.

6.1 Safe maintenance of the machine

General safety instructions

- Do not exceed maintenance deadlines.
- Switch the cutter to maintenance mode: switch off and secure against restarting. Also attach a sign to the control panel reading "DO NOT SWITCH ON".
- Only authorized service technicians may carry out service and maintenance work.
- Absolute cleanliness and order must be maintained at the work station at all times.
- Spare parts must meet the technical requirements specified by the manufacturer. Original spare parts are always guaranteed to do so.
- Wearing protective clothing is mandatory for maintenance and cleaning work (see chapter [Safety, Personal protective equipment](#) on page 44)
- Keep unauthorized personnel away from the machine during maintenance work.
- Observe the general safety instructions when handling operating materials (hazardous substances, chemicals).



6.2 Tools, operating and auxiliary materials



Tip:

A list of tools, operating and auxiliary materials is provided in the electronics spare parts catalog.

6.2.1 Tools

Description	Task
Allen screwdriver 4 x 170 mm 	For general maintenance work, removal of covers
Padlock	Secure the cutter against restarting during maintenance/cleaning
Lint-free cloth	Oil and clean the guide rails
Container	Drain the maintenance unit condensate water
Cardboard base, drip tray	Oil the Y axis guide rails
Lubricating set 	Oil the X axis guide carriage
Underlay, staple gun with staples (6 mm), industrial scissors, applicator gun, spatula,	Replace the conveyor belt. Only for cutters with material transport with conveyor belt (optional).

Description	Task
marker pen, slotted screwdriver, needle-nosed pliers, cutter blades	

6.2.2 Operating materials

6.2.2.1 Handling operating materials (hazardous substances, chemicals)

Observe the hazard pictograms as well as the H and P sets (formerly R and S sets) which may be affixed to the packaging of the operating materials (cleaning agents, lubricants and adhesives). Additional information can be found in the respective safety data sheets. The safety data sheets of the operating materials used can be obtained from customer service or the respective manufacturer. Wearing liquid-tight and at least short-term resistant protective gloves and goggles is recommended.



Disposal of operating materials and contaminated aids

Residues of the operating materials, their existing substances as well as all auxiliaries that have been in contact with these substances must be disposed of in an environmentally friendly and proper manner. This applies in particular to lubricants, adhesives and water/oil mixtures (maintenance unit).

- Observe the country-specific rules on environmental protection when disposing of waste materials (hazardous substances, chemicals).
- Collect and store waste material separately in suitable containers and dispose of them only at official sites.
- Allow contaminated items such as cloths and brushes to dry and dispose of them in the same way as the operating materials.

6.2.2.2 Cleaning agents



Note:

The use of incorrect cleaning products, not approved by Zünd, can damage the machine.

- Only use cleaning fluids recommended by Zünd Systemtechnik.
- Do not use abrasive cleaning agents. Caustic substances and scouring agents can damage the surfaces of the cutter (e.g., operating unit).

Cleaning agents	Place of use
Commercial plastic cleaning agent	Covers, metal parts

6.2.2.3 Lubricant

Guide rails, guide bearings, guide carriages

The synthetic lubricant is also used in the food and pharmaceutical industries. It has good water resistance and at the same time serves as corrosion protection.

Name	Specification
Special guide rail oil	Klüber oil [®] 4UH1

Gears

To lubricate the gears, a Teflon special grease for precision gears is used.

Name	Specification
Fin Grease MP 2/3	—

6.2.2.4 Auxiliary materials**Gluing the conveyor belt**

Name	Specification
2-component adhesive (cartridge)	50 ml + mixing jets and spatulas
Masking tape	Roll, 2 cm wide
Gaffer tape	approx. 10 cm

6.3 Maintenance list for trained operating personnel

6.3.1 Special interval

Every 24 operating hours with a router module (RM-S)

The amount of chips produced during machining depends on several parameters. Therefore, the interval is only a guideline that can be extended or shortened depending on the presence of chips within the beam.

Beam

- [Cleaning the inside of the beam](#) on page 175.

6.3.2 Daily

Safety devices

- Ensure that all EMERGENCY STOP control devices are easy to access and not hidden
 - Check light barriers on the beam
-

Cutter, general

- Visually check the machine for damage
 - Clean the machine of dust and processing residue
-

AKI tool initialization

- Clean the optical conductor of dust and processing residue

6.3.3 Weekly

Safety devices

- Check function of EMERGENCY STOP control devices
-

Advance (option)

- Clean rubber pads of the feeder elements
 - Clean feed guide rail
-

Compressor (option)

- Check the oil level; top off oil according to specifications, if necessary (carry out maintenance according to the manufacturer's operating manual)

6.3.4 Monthly

Y axis

- [Clean/oil Y axis guide rails](#) on page 181
-

Maintenance unit

- Drain condensation water (see [Draining the maintenance unit condensate water](#) on page 183)
-

Compressor (option)

- Carry out the maintenance in accordance with the manufacturer's operating instructions

6.3.5 Every six months

X axis

- [Cleaning the X axis guide rails](#) on page 177
 - [X axis, oiling the guide carriage](#) on page 178
-

Y axis drive

- Clean and lubricate the gears

6.4 Maintenance list for authorized service technicians



Caution:

Personal injury possible

Heavy or sharp-edged components as well as access to live assemblies

- Turn off the cutter at the main switch.
- This work may only be performed by authorized service technicians.

6.4.1 Special interval

Conveyor belt change

Vacuum plate

- Check leveling and adjust if required
-

Vacuum generator

- Check piping for damage and leaks
-
- Clean filter (turbine only).

6.4.2 Annually

Safety devices

- Check function of EMERGENCY STOP control devices
-
- Check function of light barriers
-

Cutter, general

- Randomly check screw connections for tightness at different points. If loose screw connections are found, tighten them and check all screw connections.
-
- Check leveling
-
- Check cabling/wiring and cable run for signs of wear
-

Vacuum plate

- Check evenness and adjust, if required
-
- Check function of vacuum slider
-

Beam

- Check parallelism and adjust, if required
-
- Check length compensation
-

Advance

- Check feed system
-
- Clean rubber pads of the feeder elements
-

Clean feed guide rail

Clean and oil feeder element piston rods

X axis drive, direct drive

Clean guide rails/oil guide carriage

Check guide carriage for ease of movement, replace if necessary

Clean drive belts

Clean drive and guide rollers

Check drive and deflection rollers for ease of movement, replace if necessary

Check if tension of the toothed belt is correct and readjust if necessary

Check if adjustment of the toothed belt is correct and readjust if necessary

Y axis drive

Clean drive belts

Clean drive and guide rollers

Check drive and deflection rollers for ease of movement, replace if necessary

Clean and oil the guide rails

Check if adjustment of the toothed belt is correct and readjust if necessary

Check if tension of the toothed belt is correct and readjust if necessary

Check if tension of the motor belt is correct and readjust, if necessary

Clean and lubricate the gears

Check gear backlash, replace the bearing if necessary

Module carriage

Check guide bearing for ease of movement, if backlash is present adjust the guide bearing until no backlash remains. Replace the guide bearing, if necessary

Oil guide bearings

Replace wiper

Vacuum generator

Check function

Clean filter, replace if necessary (turbines only)

Check piping for damage and leaks

Maintenance unit

Drain condensation water

Check pressure settings

Compressor (option)

Carry out the maintenance in accordance with the manufacturer's operating instructions

6.5 Cutter maintenance mode



Warning:

Risk of injury

The cutter can be mistakenly put into operation during maintenance.

- Always place the cutter into maintenance mode before carrying out maintenance work!

Unless expressly required otherwise, put the machine into maintenance mode before starting maintenance work.



A Turn off the machine with the main switch.

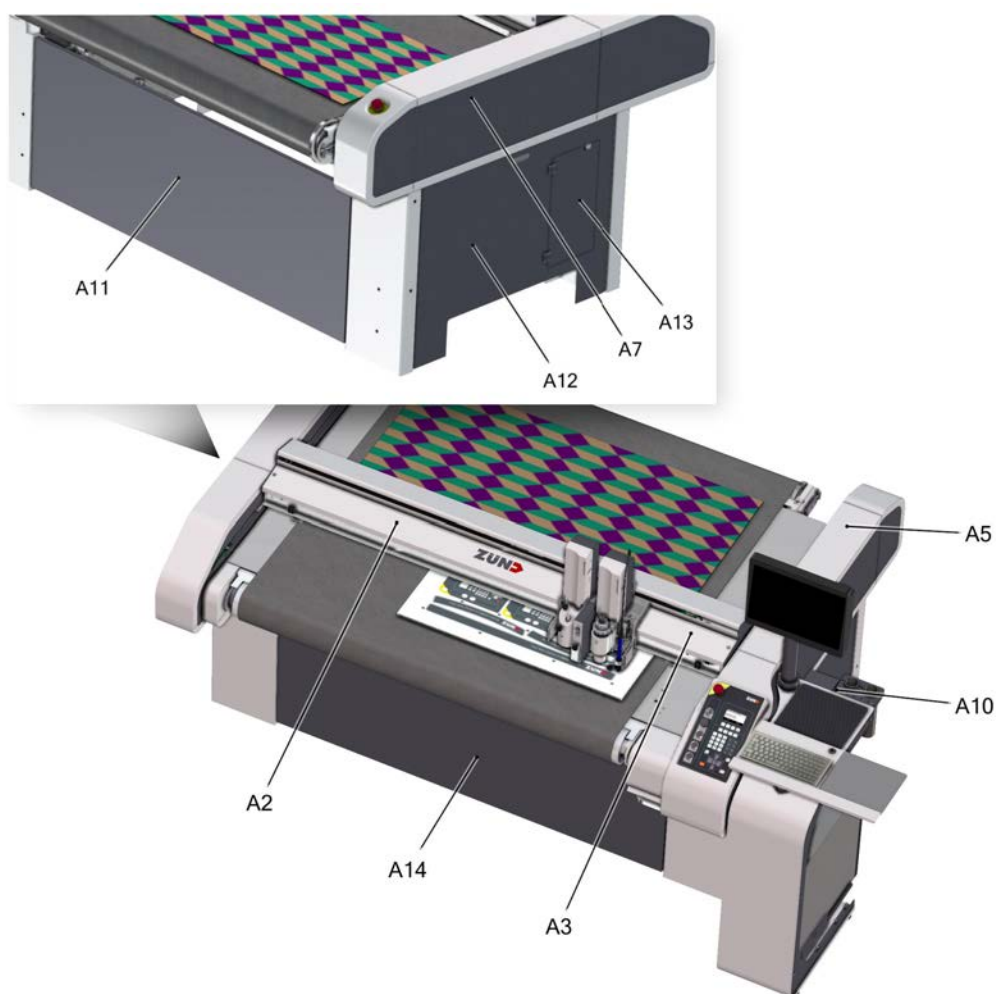
B Protect the machine against unauthorised start-up (block the main switch with a padlock).

6.6 Service flaps and covers



Caution:

For safety reasons, all other covers should only be opened for service work by Zünd personnel or personnel authorized by Zünd.



Pos	Name	Task
A10/A5	Cover	Oiling and cleaning the right guide rails
A12/A7	Cover	Oiling and cleaning the left guide rails
A2/A3	Cover	Oiling and cleaning the module carriage guide rails
A13	Maintenance unit access	Drain the condensate water, set the pressure
A10	Power box cover	Fuses
A11/A14	Cover	Changing the conveyor belt, vacuum generator access

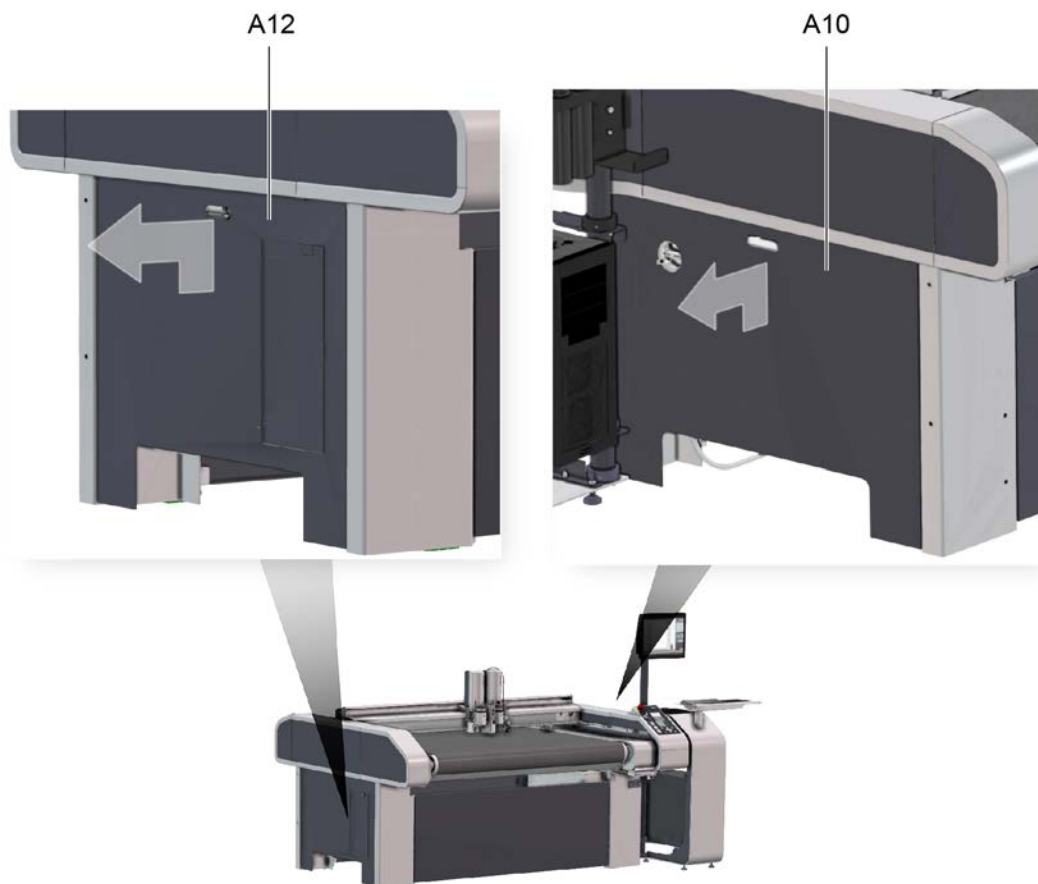
6.6.1 Removing the covers



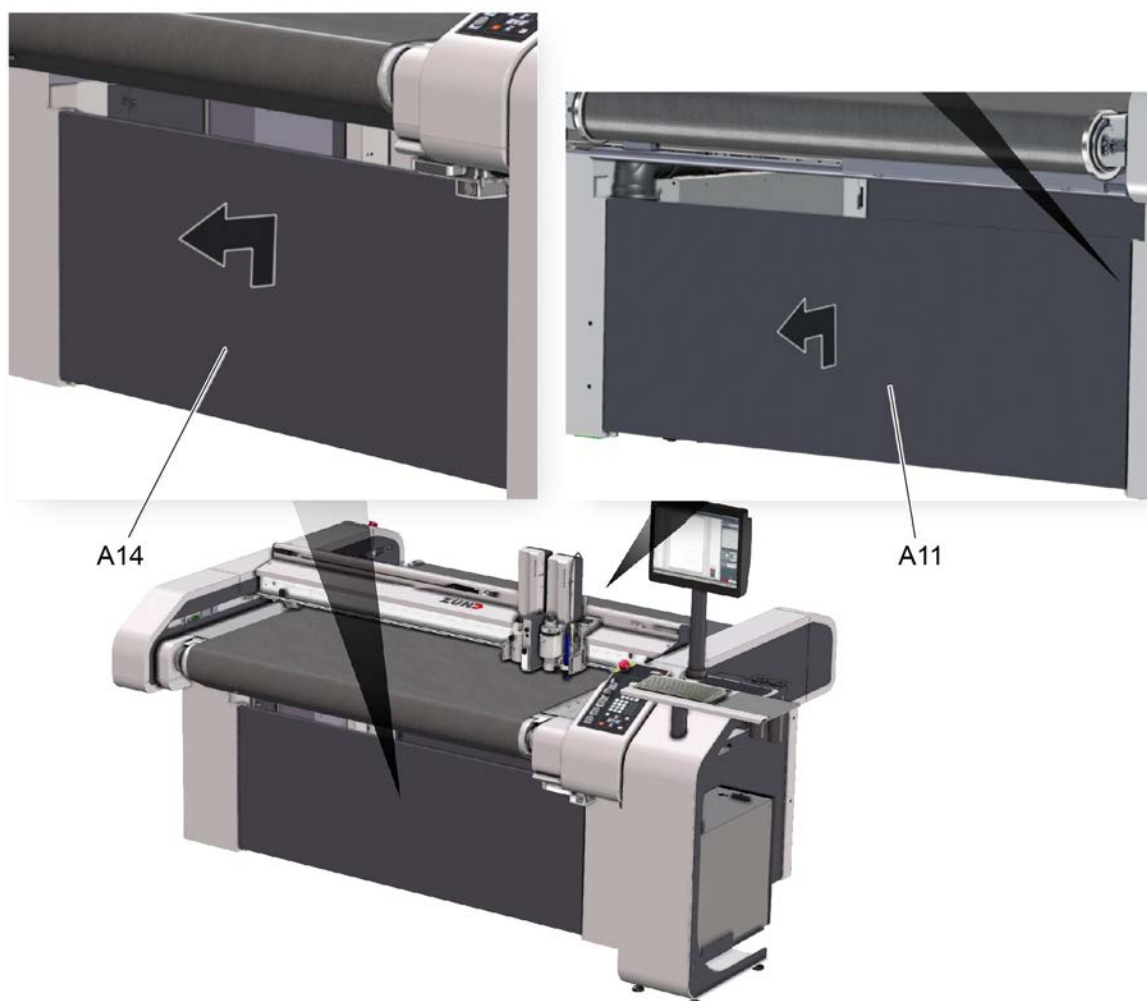
Note:

An EMERGENCY STOP control device is attached to the left beam cover. When installing/removing the cover, ensure that the cable is not damaged.

Side covers (A10, A12)



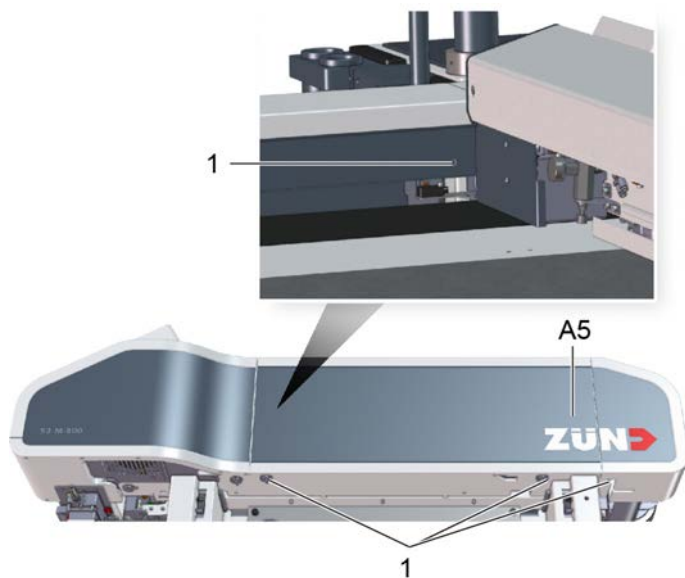
- A** Turn off the machine at the main switch.
- B** Lift up the cover and tilt it out.
- C** Perform the maintenance work.
- D** Thread the covers into the bracket and lower.

Front/rear cover (A11, A14)

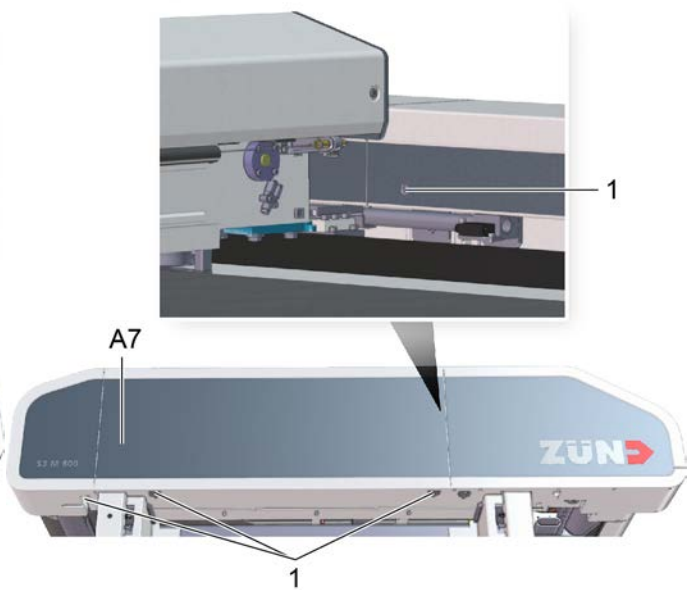
- A** Switch off the cutter at the main switch.
- B** Unscrew the screws for the cover.
- C** Lift up the cover and tilt it out.
- D** Perform the maintenance work.
- E** Thread the covers into the bracket and lower.

Side support covers (A5, A7)

Side support cover on the right (A5)

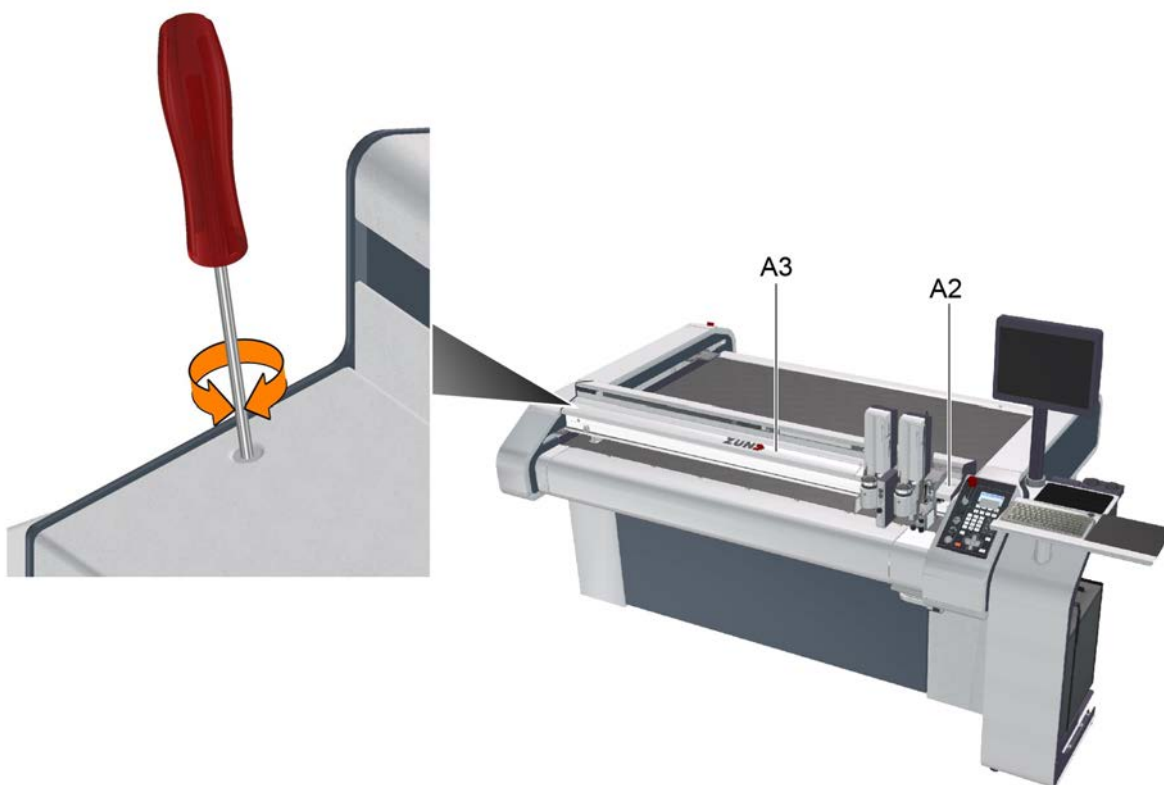


Side support cover on the left (A7)



- A** Turn off the cutter.
- B** Push the beam all the way forward.
- C** Remove covers A10 and A12.
- D** Loosen the screws on the side support right (A5) and left (A7).
- E** Remove the covers and place on the working area.
- F** Perform the maintenance work.
- G** Thread the covers into the bracket and secure with the screws.

Beam covers (A2, A3)



Tip:

The covers are additionally fastened onto the beam with Velcro.

- A** Switch the cutter to maintenance mode.
- B** Move the beam forward manually.
- C** Unscrew the screws at the ends (spanner size T10) and remove with the washers.
- D** Press the module carriage to the right to remove the left cover.
- E** Press the module carriage to the left to remove the right cover.
- F** Remove the cover and place on the working area.
- G** Perform the maintenance work.
- H** Place the covers, press down firmly and secure with the screws.

Once the maintenance work is complete, reattach the covers.

6.7 Visually inspecting the machine for damage



Caution:

There is a risk of injury if the machine is damaged!

Before daily start-up, ensure that there is no damage on the cutter.

- Never start up a damaged cutter or damaged options.
- Have damage repaired immediately by an authorized service technician or trained service personnel.

- A** Walk around the cutter with present options and check it/them for damage.
- B** Make sure that all the covers have been fitted. Attach missing covers before switching on.

6.8 EMERGENCY STOP control devices function test



Danger:

Risk of injury due to defective EMERGENCY STOP control devices!

Machines with defective EMERGENCY STOP control devices are not safe for operation. The machine cannot be stopped promptly in hazardous situations.

- Check the function of all EMERGENCY STOP control devices weekly.
- Do not start up a machine with defective EMERGENCY STOP control devices until the problem has been remedied by authorised personnel.

- A** Activate an EMERGENCY STOP control device before starting work or after initialising the machine.
- B** Repeat the process sequentially for all remaining EMERGENCY STOP control devices.

Results

If the machine stops correctly, operational safety is ensured.

6.9 Cleaning the machine



Caution:

Risk of injury from sharp tools!

- Remove all modules and tools from the machine before cleaning. For further information, see Danger area during cleaning.



Note:

Do not use compressed air to clean the machine.

Loose cuttings and other dirt will end up in the bearings and drive belts and damage them.



Note:

Danger of damaging the machine!

Incorrect cleaning products and methods will damage the machine.

- Only use gentle cleaning agents and plastic maintenance products for cleaning.
- Never clean the machine using ultrasound, a steam jet, compressed air, etc.

Zünd cutters are production machines that are subject to enormous amounts of stress on a daily basis. Keeping the machine clean will help ensure uninterrupted operation.

Procedure

- Remove all tools and modules from the module carriage (see [Inserting/replacing the module](#) on page 90 as well as detailed descriptions in the instructions of the individual modules/tools).
- Switch the machine to maintenance mode (see [Maintenance](#) on page 159).
- Clean the table plate, operating unit, all covers and panels with a plastic maintenance product at regular intervals (weekly).
- Regularly (daily) remove all material residues from the table, the tools and modules.
- Keep the surrounding area clean (free from material residues, dust).

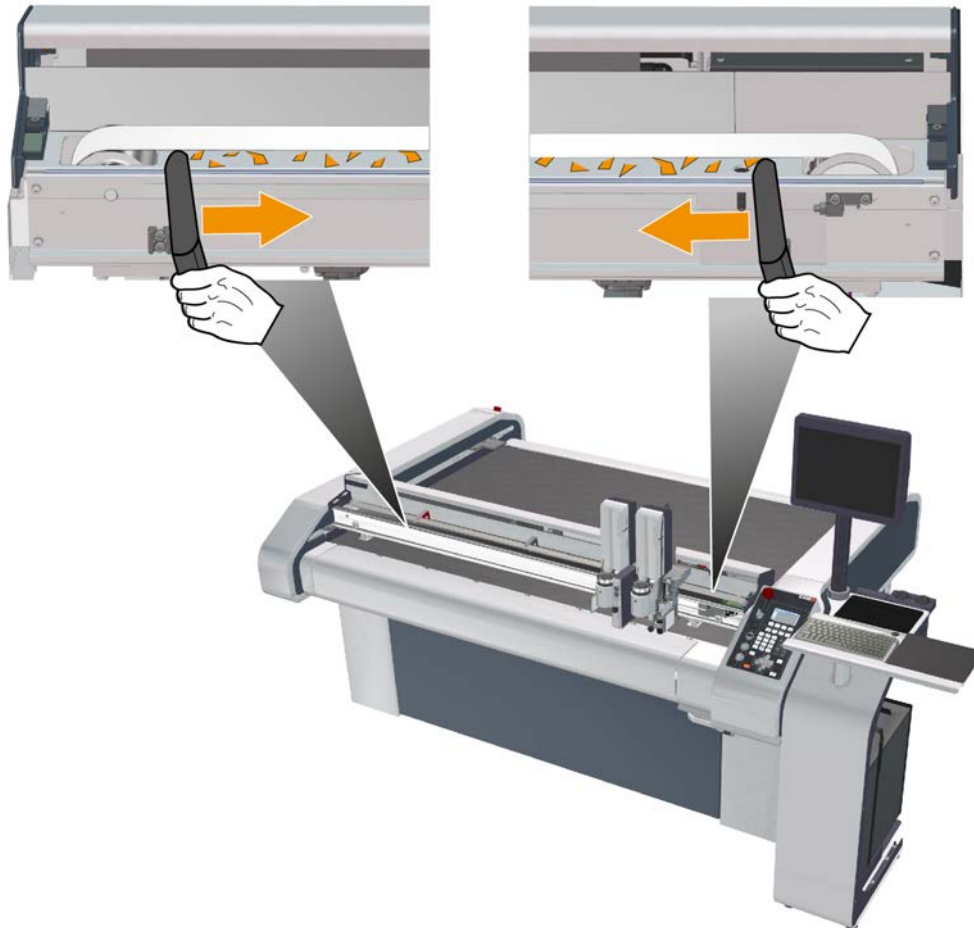
6.10 Cleaning the inside of the beam



Note:

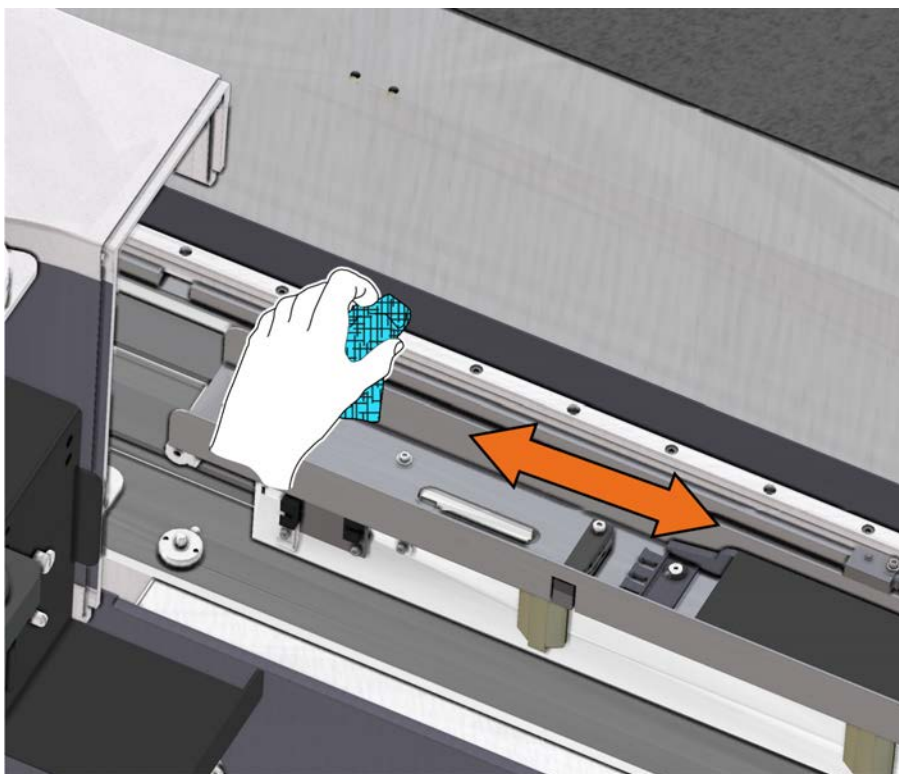
Chips can cause damage to the Y drive

- When vacuuming, be careful not to push any chips into the recesses of the guide rollers or holes.



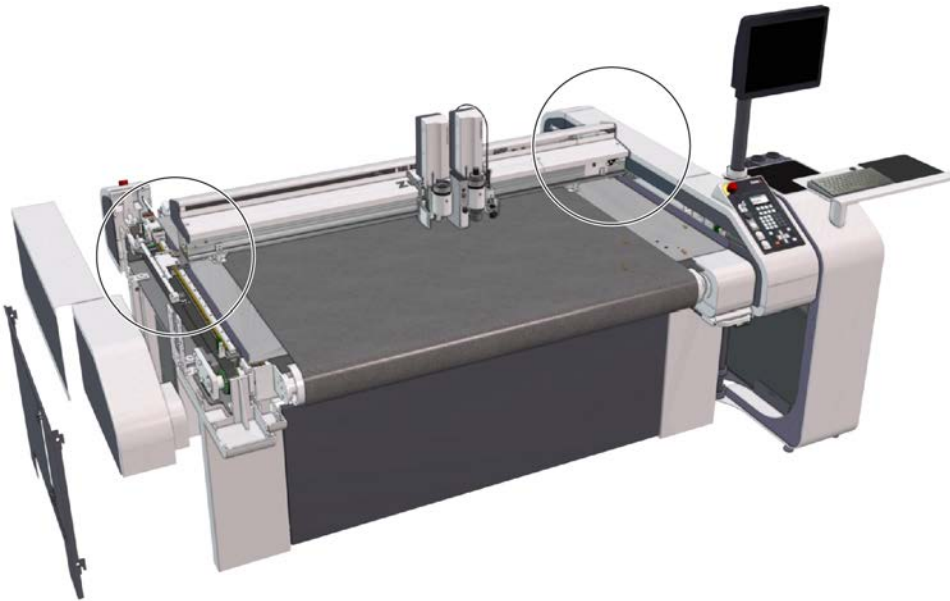
- A Push the bar forwards.
- B Remove the beam covers (see [Service flaps and covers](#) on page 169).
- C Vacuum up the chips from the ends of the beams to the middle.
- D Vacuum the chips out of the hollow spaces.
- E Replace the beam covers.

6.11 Cleaning the X axis guide rails



- A** Put the cutter into maintenance mode (see [Cutter maintenance mode](#) on page 168).
- B** Remove covers A5, A7, A10 and A12 (see [Side support covers \(A5, A7\)](#) on page 172)
- C** Thoroughly clean the entire length of the guide rails using a lint-free cloth.
- D** Soak a lint-free cloth with special guide rail oil and oil the guide rails.
- E** Install all covers.

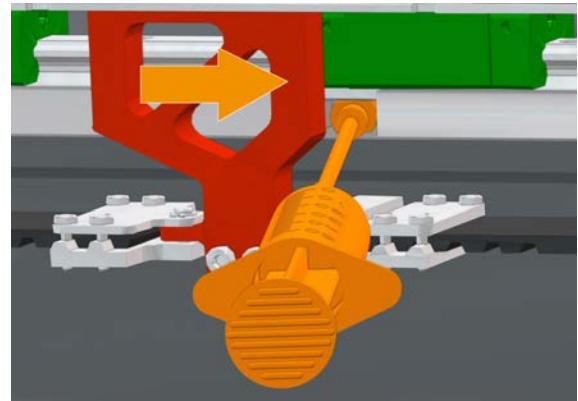
6.12 X axis, oiling the guide carriage



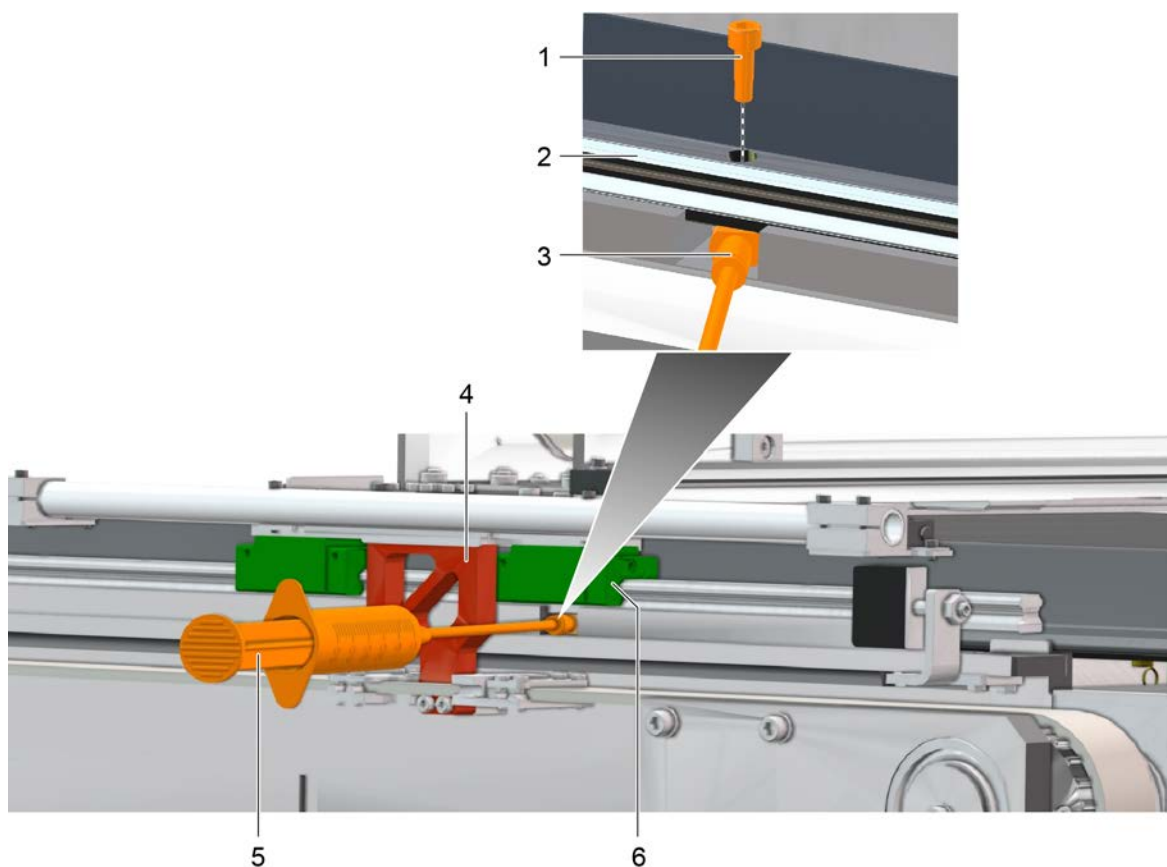
Note:

Damage to the lubricating set possible

- Before moving the beam to oil the second guide carriage, unscrew the syringe with hose from the lubrication connection.



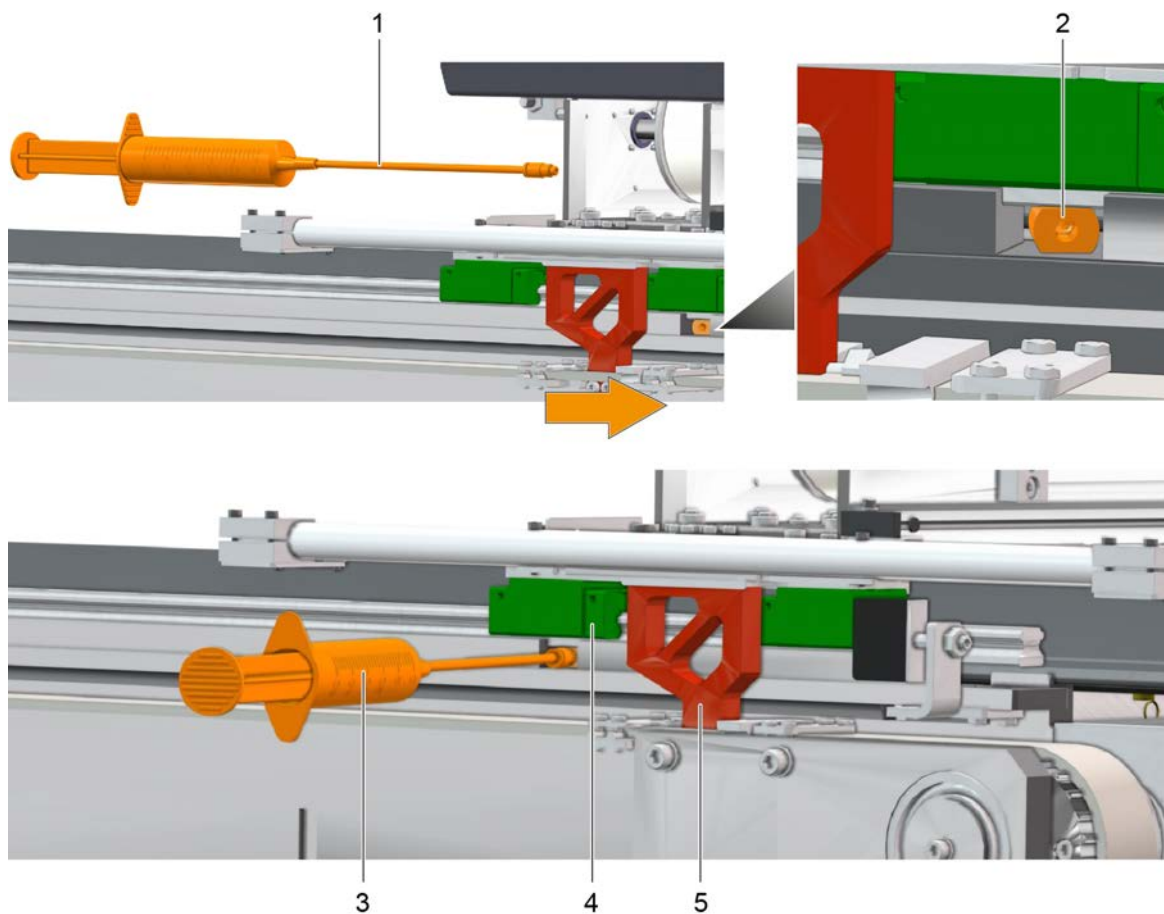
6.12.1 Oiling the front guide carriage



- | | | | |
|---|------------------------|---|----------------|
| 1 | Hollow screw | 4 | Belt anchor |
| 2 | Guide rail | 5 | Syringe |
| 3 | Lubrication connection | 6 | Guide carriage |

- A** Put the cutter into maintenance mode (see [Cutter maintenance mode](#) on page 168).
- B** Remove covers A10 and A12 (see [Side covers \(A10, A12\)](#) on page 170)
- C** Remove side support covers A5 and A7 (see [Side support covers \(A5, A7\)](#) on page 172)
- D** Thoroughly clean the entire length of the guide rails using a lint-free cloth.
- E** Push the beam backwards.
- F** Unscrew the hollow screw from the lubrication connection.
- G** Install the lubrication connection of the lubricating set onto the guide rail from below.
- H** Press the syringe until some oil comes out of the hollow screw.
- I** Position the front guide carriage above the lubrication connection.
- J** Using the syringe, press approx. 1 ml of special guide rail oil into the guide carriage.

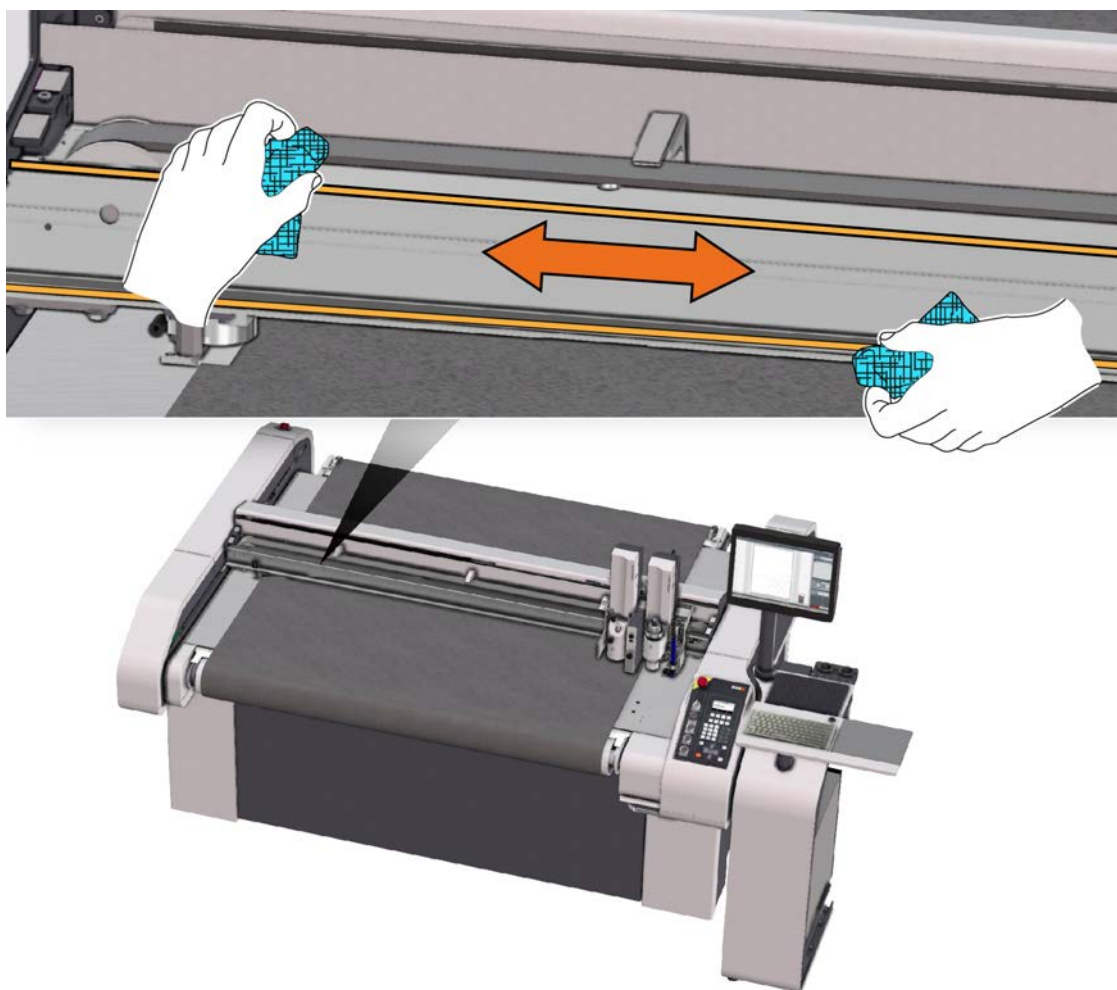
6.12.2 Oiling the rear guide carriage



- | | | | |
|---|---------------------------|---|----------------|
| 1 | Lubricating set detached | 4 | Guide carriage |
| 2 | Lubrication connection | 5 | Belt anchor |
| 3 | Lubricating set assembled | | |

- A** Unscrew the syringe with hose from the lubrication connection.
The lubrication connection remains on the guide rail.
- B** Push the beam all the way forward.
- C** Screw the syringe with hose into the lubrication connection.
- D** Press the syringe until some oil comes out of the hollow screw.
- E** Position the guide carriage above the lubrication connection.
- F** Using the syringe, press approx. 1 ml of special guide rail oil into the guide carriage.
- G** Dismantle the complete lubricating set.
- H** Move the beam back and forth ten times.
- I** Clean the area using a lint-free cloth.
- J** Install the covers.
- K** Repeat oiling of the guide carriage on the other side.

6.13 Clean/oil Y axis guide rails



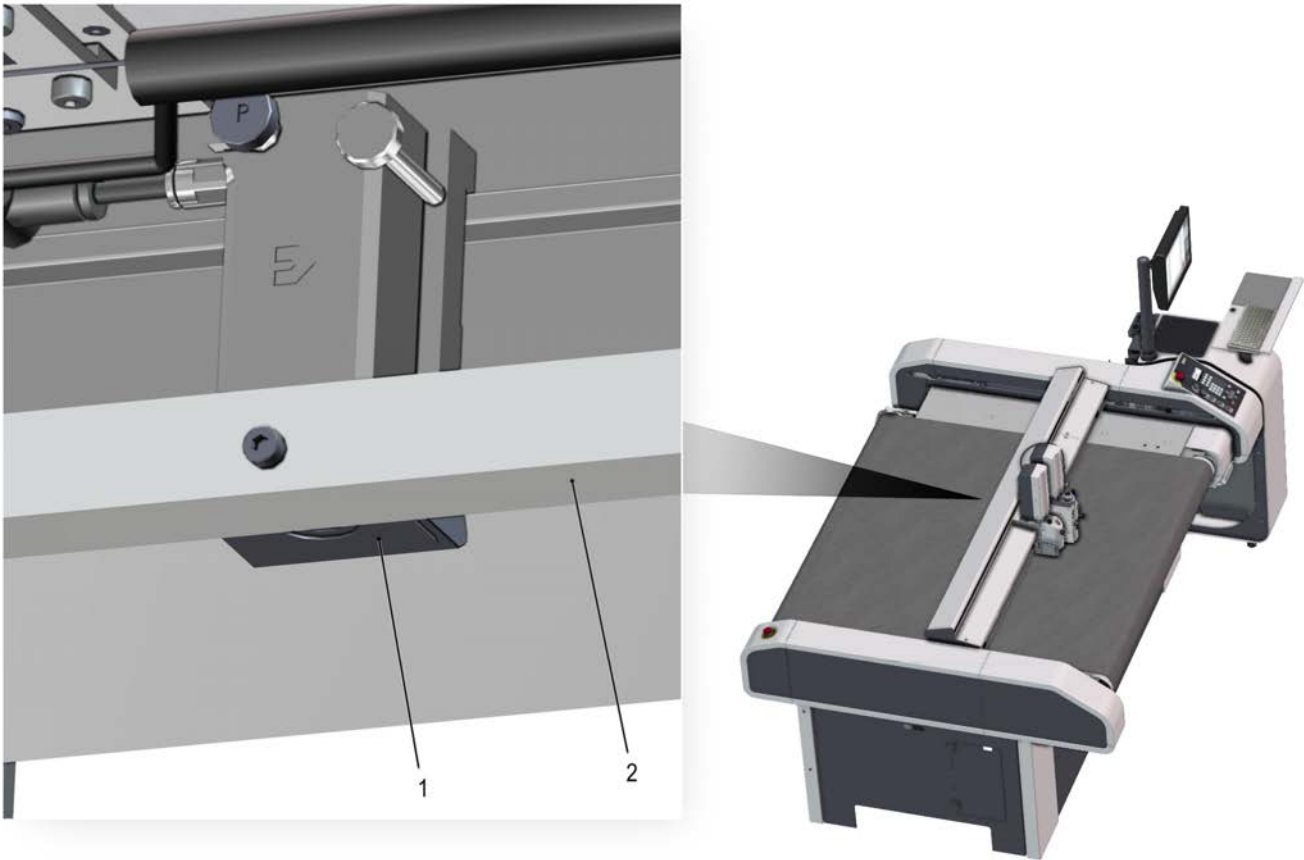
- A Turn off the cutter.
- B Remove covers A2 and A3 (see [Beam covers \(A2, A3\)](#) on page 173).
- C Clean entire length of the guide rails using a lint-free cloth.
- D Soak a lint-free cloth with special guide rail oil and oil the guide rails.
- E Install all covers.

6.14 Cleaning the feeding clamps/feed guide rail

Tools and materials

- Lint-free cloth
- Alcohol

Procedure

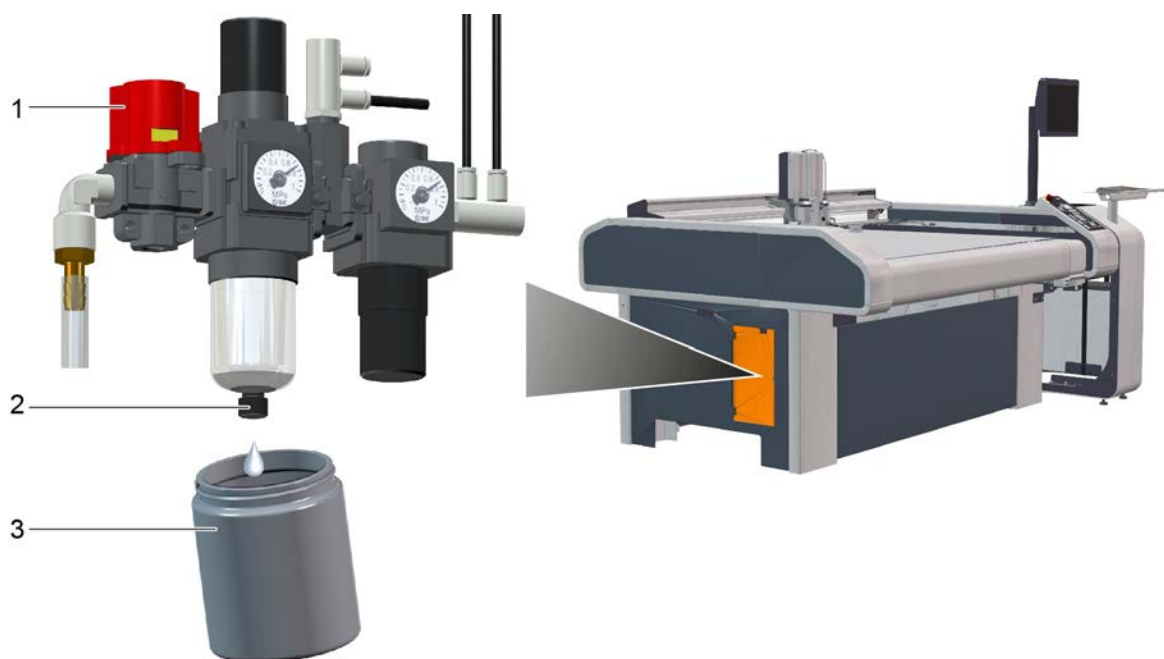


- 1 Feeding clamp, rubber pads
- 2 Feed guide rail

A Turn off the cutter.

B Clean the feeding clamps/feed guide rail with a lint-free rag and alcohol.

6.15 Draining the maintenance unit condensate water



- 1 Stopcock
2 Drain screw

- 3 Container



Disposal

The condensate water can become contaminated by oil. Therefore, the condensate water must be disposed of properly according to the specific national regulations.

- A** Open the access point to the maintenance unit (see [Service flaps and covers](#) on page 169).
- B** Set the stopcock on the maintenance unit to "Off".
- C** Hold a container under the drain.
- D** Open the drain screw.
- E** Allow the liquid to drip into the container.
- F** Close the drain screw.
- G** Close the access point to the maintenance unit.
- H** Dispose of the container in an environmentally friendly manner.

6.16 Resetting 12.5/14.0 kW vacuum pump motor protection relay

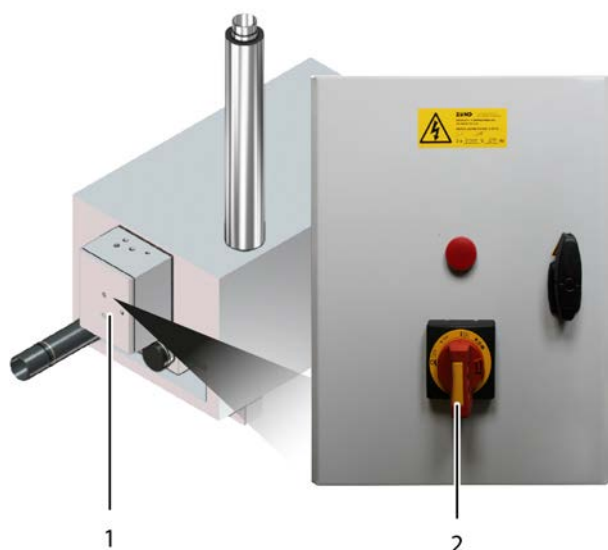
The motor protection relay cuts the 12.5/14.0 kW power supply to the vacuum pump under the following circumstances:

- Overload
- Short-circuit
- Phase failure
- Current asymmetry
- Overheating




Note:

Repeatedly triggering the motor protection relay may damage the vacuum pump!
Contact customer service.



- 1 Switch box
- 2 Main switch

- A** Check visible connectors of cables from vacuum box switch box for damage. (The vacuum pump has its own power connection.)
- B** If the vacuum pump is overheated, let it cool down first.
- C** At the vacuum pump control box, set the main switch to OFF and then to ON. (See Vacuum Pump Operating Manual, section "Additional Descriptions")
- D** Check the function of the vacuum pump: switch on the vacuum on the cutter (Shift + )

6.17 Reset 2.2/2.55 kW, 4.0/4.6 kW, 5.5/6.3 kW vacuum pump, motor protection relay

The motor protection relay cuts the 2.2/2.55 kW, 4.0/4.6 kW, 5.5/6.3 kW power supply to the vacuum pump under the following circumstances:

- Overload
- Short-circuit
- Phase failure
- Current asymmetry
- Overheating




Note:

Repeatedly triggering the motor protection relay may damage the vacuum pump!
Contact customer service.



- 1 Switch box
- 2 Reset switch

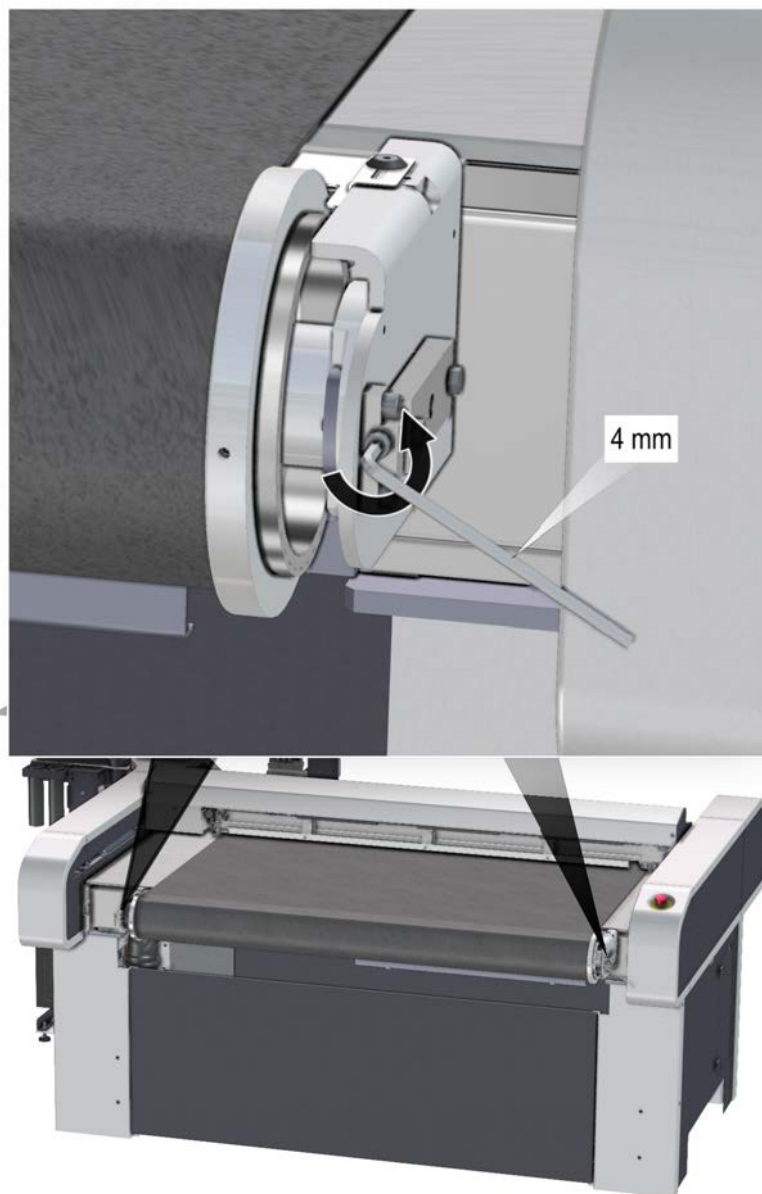
- A Check visible connectors of cables from vacuum box switch box for damage. (The vacuum pump has its own power connection.)
- B If the vacuum pump is overheated, let it cool down first.
- C Press the reset button on the vacuum pump control box (see Vacuum Pump Operating Manual, section "Additional Descriptions").
- D Check the function of the vacuum pump: switch on the vacuum on the cutter (Shift + )

6.18 Replacing the conveyor belt

Keep the following tools and materials ready:

- Conveyor belt
- Underlay with protective cover
- Stapler with suitable staples (6 mm)
- Dosing gun
- 2-component adhesive (cartridge)
- Spatula
- Masking tape (2 cm wide)
- Gaffer tape
- Industrial scissors

6.18.1 Removing the conveyor belt

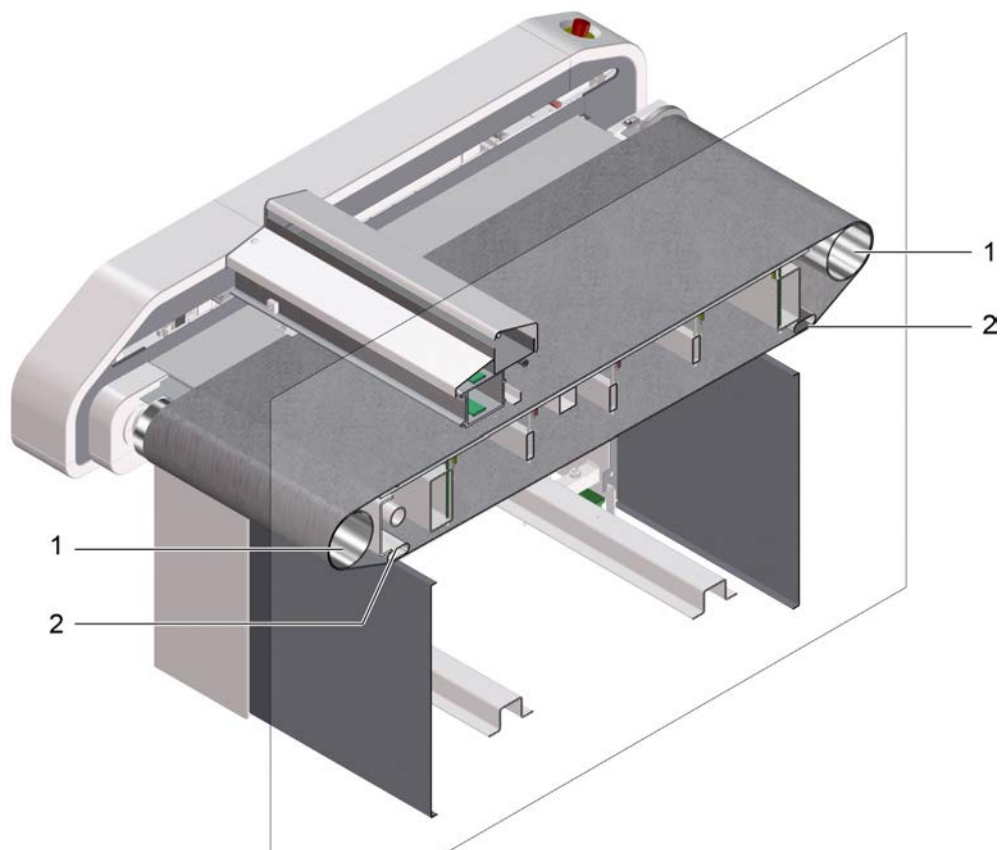


A Release the tensioning screws on both sides.

- B** Cut the conveyor belt using **scissors** and remove it.
- C** Dispose of the conveyor belt correctly.

6.18.2 Installing the conveyor belt

6.18.2.1 Overview of conveyor belt loops

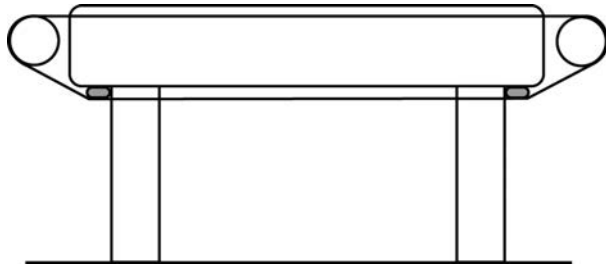


- 1 Guide rollers
- 2 Conveyor belt guide

6.18.2.2 Guide rollers overview

6.18.2.2.1 Cutter without CE

Version with guide profile



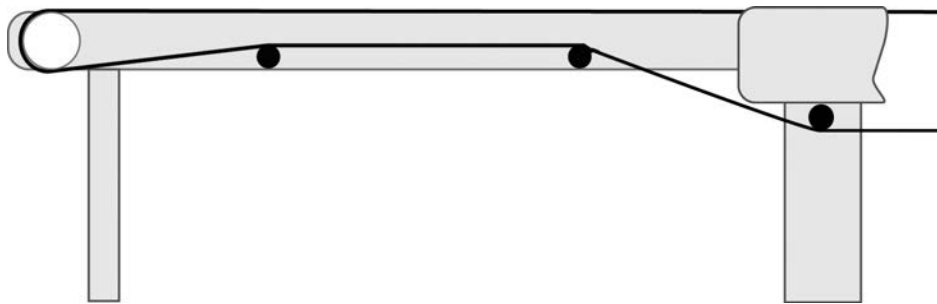
6.18.2.2.2 Cutter with CE



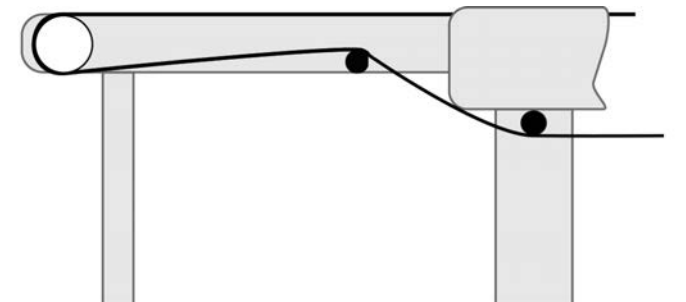
Tip:

Proceed the same for front and back.

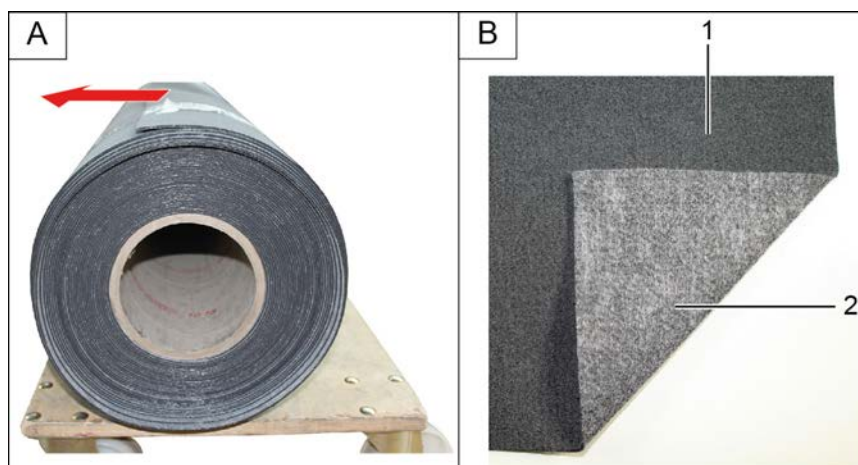
Whole extension



Half extension



6.18.2.3 Rolling off the conveyor belt



- 1 Conveyor belt, top side
2 Conveyor belt, underside

**Note:**

Risk of damage to the conveyor belt.

Make sure that the knife does not cut into the conveyor belt when cutting the packaging.

- A** Unroll the conveyor belt as shown in the illustration.
B Make sure that the longitudinal seam is on the left side of the cutter.
 a) If necessary, adjust the grain direction to the material to be transported.
C The lighter side of the conveyor belt must face downward.

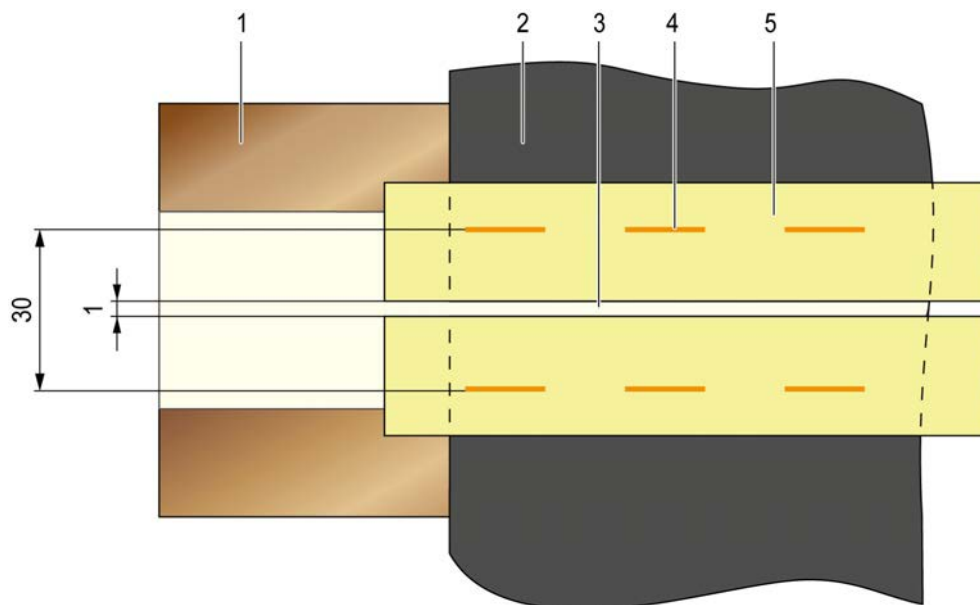
6.18.2.4 Looping in and aligning the conveyor belt

- A** Pull the conveyor belt under the beam and align to the middle of the table (X axis).
B Switch-on the vacuum to fix the conveyor belt.
C Align the conveyor belt parallel to the X axis:
 a) Use the laser pointer, if available.
 b) Alternatively, measure manually.
D After alignment, fix the conveyor belt with adhesive tape.
E Completely unroll the conveyor belt.
F Loop through the conveyor belt as shown in the illustrations above.

6.18.3 Gluing the conveyor belt

6.18.3.1 Overview

6.18.3.1.1 Description of the adhesive joint of a new conveyor belt



- | | | | |
|---|--------------------------------|---|-----------------------------------|
| 1 | Underlay with protective cover | 4 | Staples (under the adhesive tape) |
| 2 | Conveyor belt | 5 | Adhesive tape |
| 3 | Adhesive joint | | |

6.18.3.1.2 Adhesion point of a used conveyor belt



Tip:

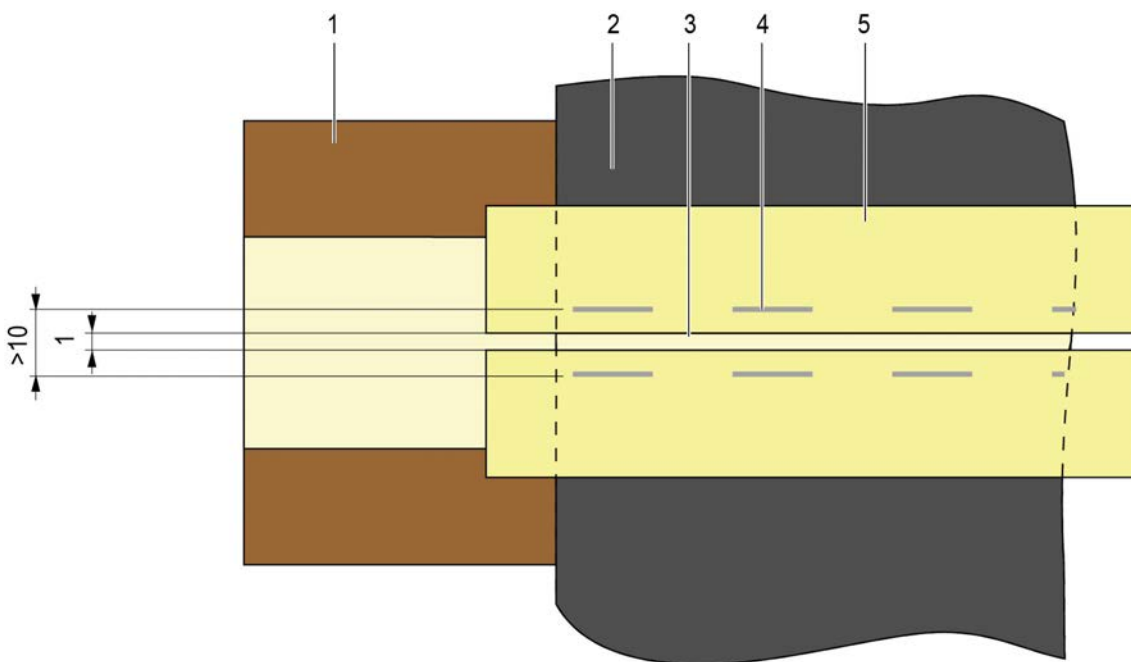
For a conveyor belt that has already been used, it may be necessary to place the staples closer to the adhesion point.

Advantages:

- Preventing both conveyor belt ends standing up
- Preventing the glue running under the adhesion point

Disadvantages:

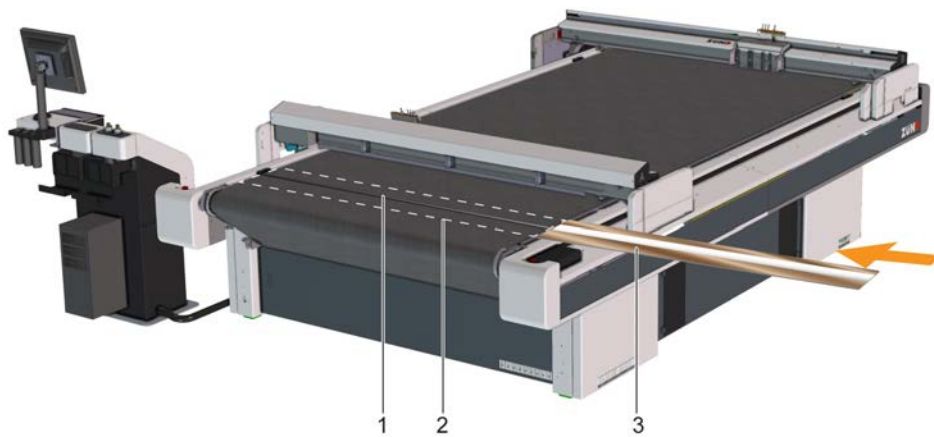
- The staples being close to the adhesion point can cause unevenness when peeling off the glue.



- | | | | |
|---|--------------------------------|---|-----------------------------------|
| 1 | Underlay with protective cover | 4 | Staples (under the adhesive tape) |
| 2 | Conveyor belt | 5 | Adhesive tape |
| 3 | Adhesion point | | |

6.18.3.2 Steps

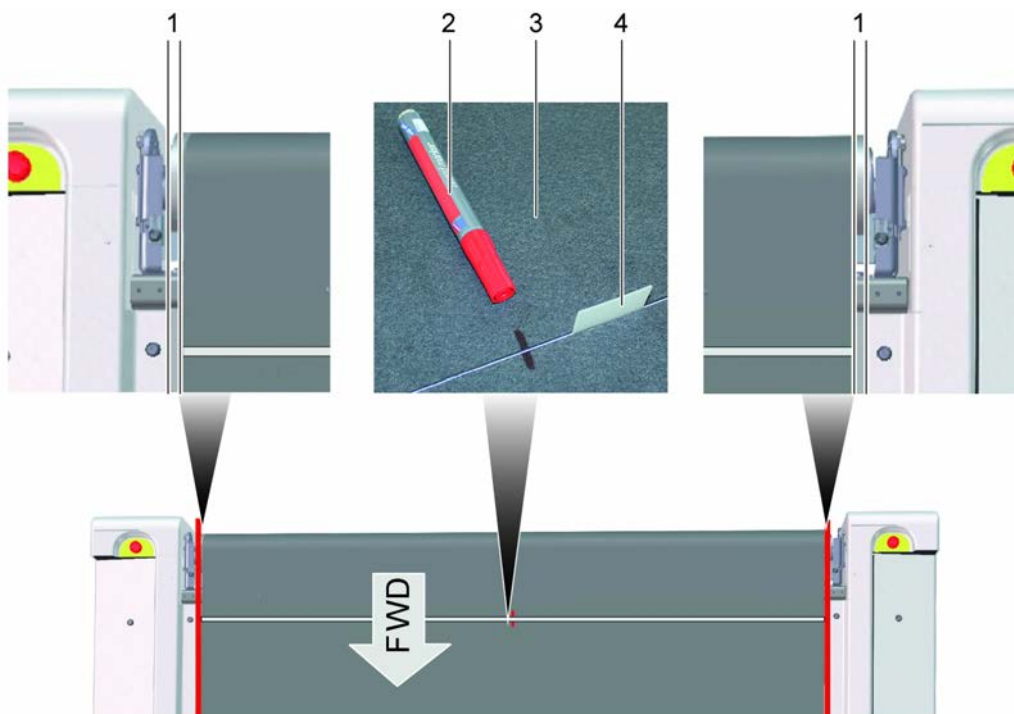
6.18.3.2.1 Position underlay



- 1 Joint
- 2 End position of the underlay
- 3 Underlay with protective cover

- A** Slide the underlay with protective cover upwards beneath the joint of the conveyor belt.
- B** Align the underlay so that it lies in the center under the joint and protrudes on both sides.

6.18.3.2.2 Aligning the conveyor belt



- 1 Correct alignment of the conveyor belt (left and right)
- 2 Marker pen

3 Conveyor belt

4 Spatula

A Align both ends of the belt to one another:

a) Align the edges with the same alignment to one another (on both the left and right sides).

B Mark the conveyor belt in the middle if the table size > L.

C Switch on the vacuum.

D Press the conveyor belt together until the adhesive joint is 1 mm wide.

E Insert the spatulas into the adhesive joint every 8 cm.

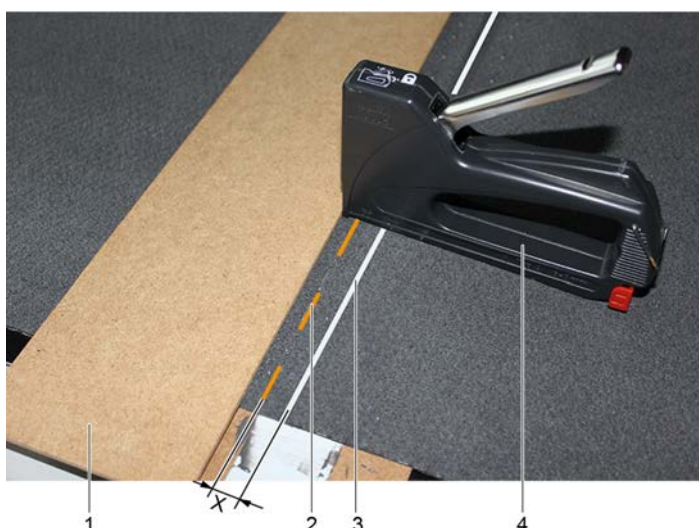
F Press the conveyor belt against the spatulas.

Results

The conveyor belt is parallel to the table.

There is a 1 mm wide adhesive joint.

6.18.3.2.3 Fixing the first end of the conveyor belt



1 Stop

2 Staples

3 Adhesive joint

4 Staple gun

x Gap between staples and adhesive joint

Note:

Distance X: new conveyor belt = 15 mm, used conveyor belt = 5 mm.

A Use the staple gun to place two staples on the long end to prevent slipping.

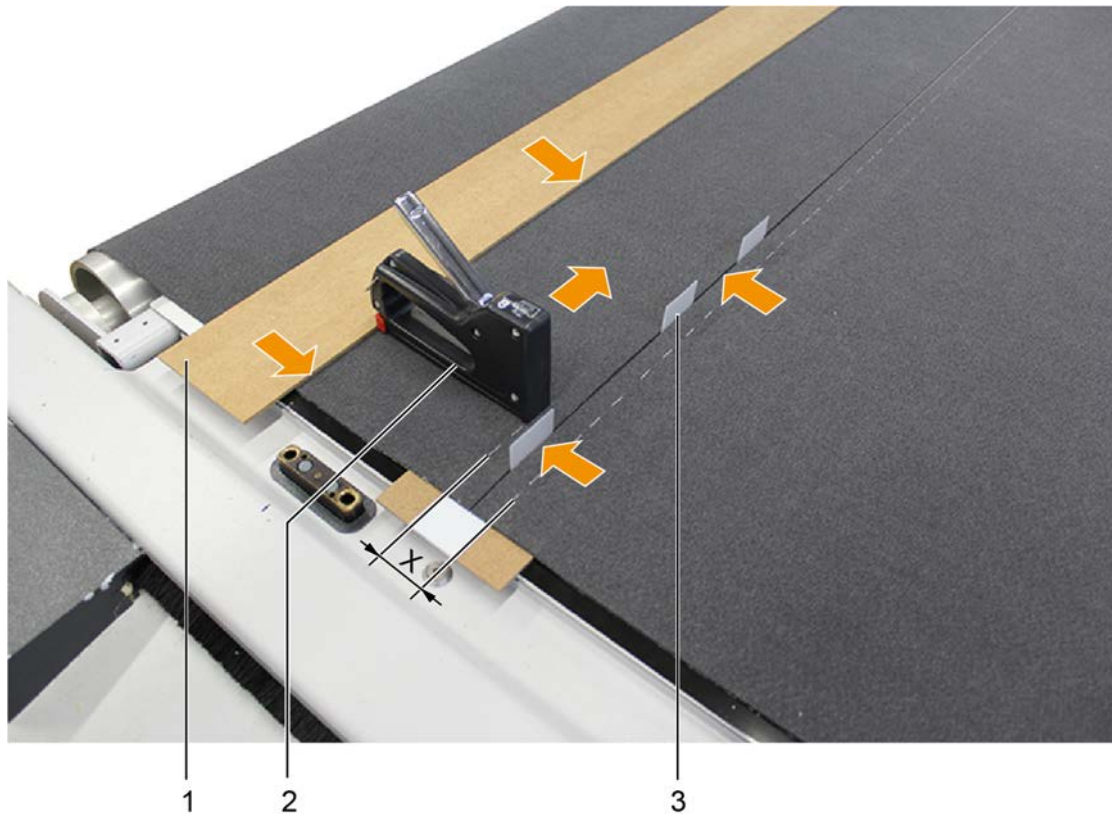
B Press the short end of the conveyor belt onto the spatula and insert two staples with the staple gun.

C Align the stop.

D Use the staple gun to place staples along the stop at 10 mm intervals.

E Repeat until the long end is completely fixed.

6.18.3.2.4 Fixing the second end of the conveyor belt



1 Stop as guide

2 Staple gun

3 Spatula in adhesive gap

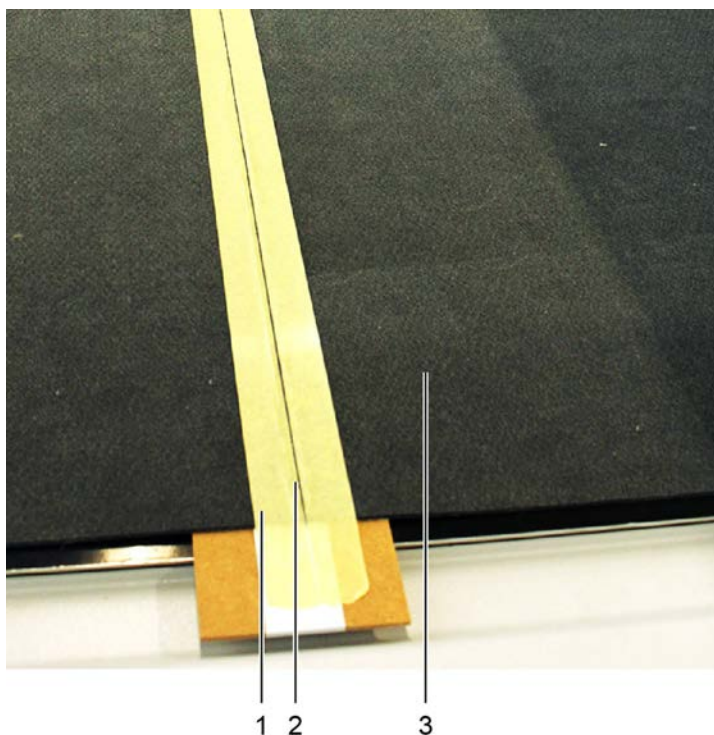
x Distance between staples

Note:

Distance X: new conveyor belt = 30 mm, used conveyor belt = 10 mm.

- A Evenly distribute the spatulas at intervals of approx. 8 cm.
- B Align the stop.
- C Use the staple gun to place staples along the stop at 10 mm intervals.
- D Remove the spatulas after stapling and reuse them as spacers.
- E Repeat until the short end is completely fixed.

6.18.3.2.5 Adhering the adhesive tape



- 1 Adhesive tape
- 2 Adhesive joint
- 3 Conveyor belt

A Precisely adhere the tape along the edge of the adhesive joint and press down.

B Repeat this step on the other side of the adhesive joint.

6.18.3.2.6 Gluing process narrow conveyor belt (M, L)



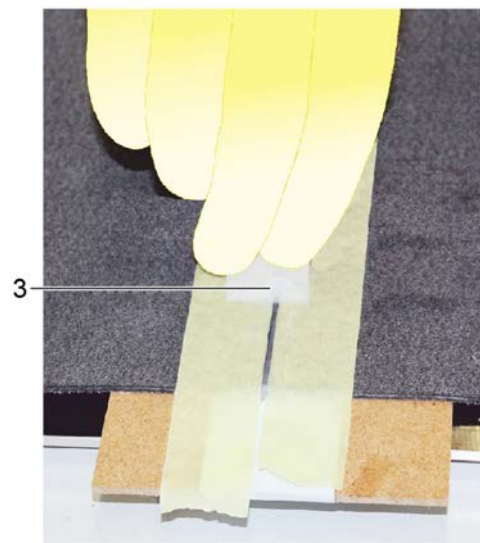
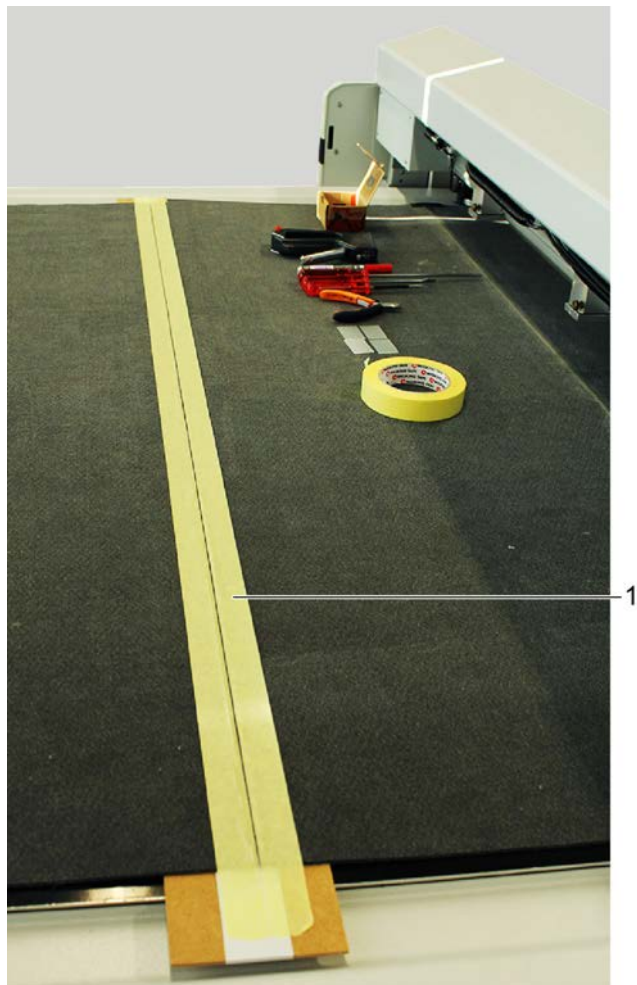
Caution:

The glue is hazardous to health and irritates the eyes, respiratory organs, and skin.

- Ventilate the workplace well.
- Do not inhale the fumes.
- Do not allow the glue to come into contact with the skin, eyes or mucous membranes.
- Wear protective gloves made of nitrile rubber/nitrile latex (NBR 0.8 mm) if there is risk of contact with the glue.

Note:

Refer to the data sheet for the adhesive for processing and drying times.



- 1 Adhesive tape
- 2 Glue mixture
- 3 Spatula

A Take a static mixer out of the adhesive set and put it into the glue gun.

a) Put on the static mixer.

b) Rotate the static mixer 90° clockwise until it stops.

B Open the glue gun, insert the cartridge and close it again.

C To mix the glue, activate the glue gun several times and put about 5 cm of glue onto a sheet of paper.

The emitted glue is mixed.

D Place the glue gun at an angle of about 75° to the adhesive joint.

E Activate the glue gun and apply slowly and evenly along the adhesive joint.

F Use a spatula to remove excess glue.

G Remove the adhesive tape.

H Allow the glue to dry for about 30 minutes.

6.18.3.2.7 Gluing process wide conveyor belt (XL, 2XL, 3XL)

Note:

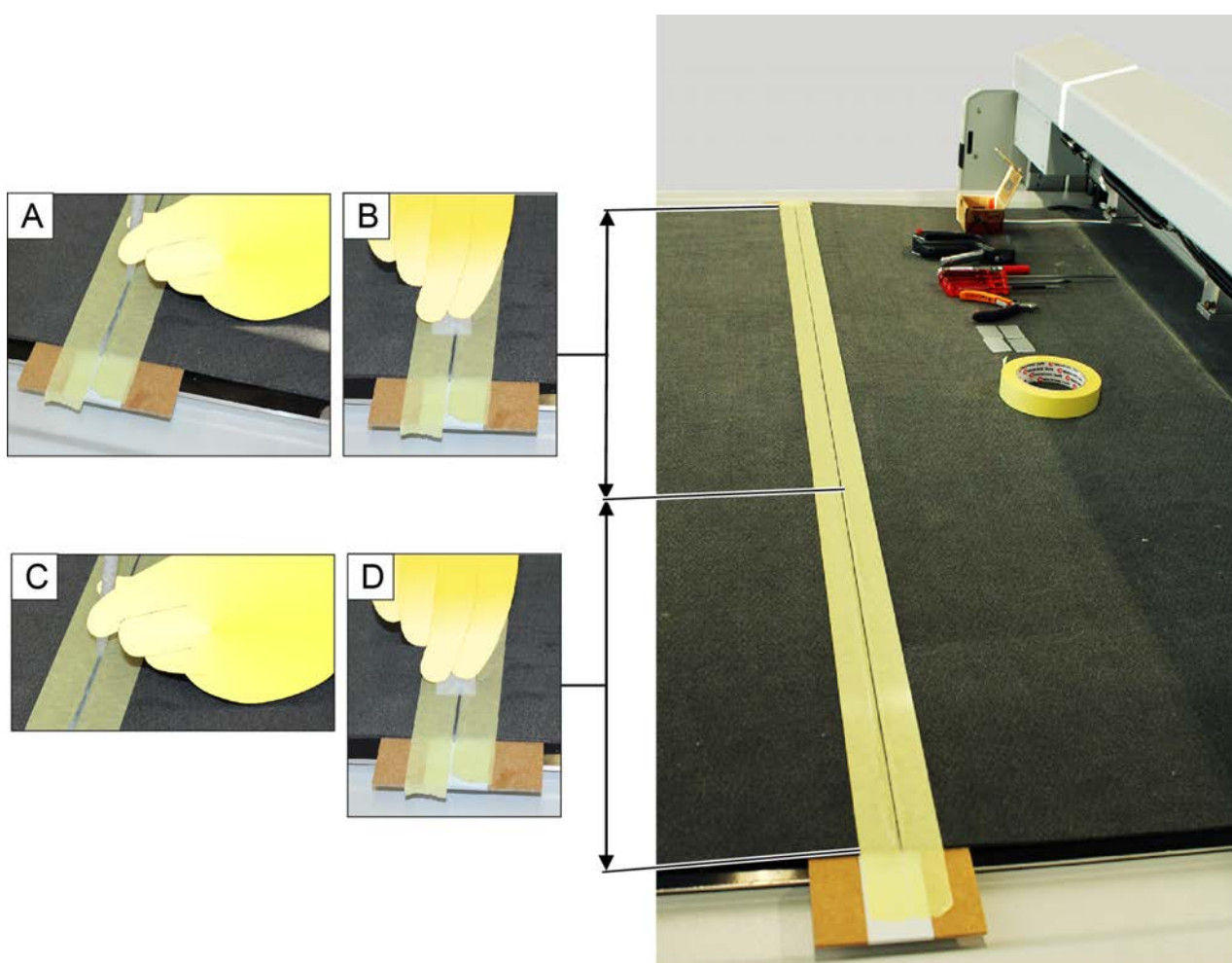
The wide conveyor belt is glued in 2 steps.

Refer to the data sheet for the adhesive for processing and drying times.

**Caution:**

The glue is hazardous to health and irritates the eyes, respiratory organs, and skin.

- Ventilate the workplace well.
- Do not inhale the fumes.
- Do not allow the glue to come into contact with the skin, eyes or mucous membranes.
- Wear protective gloves made of nitrile rubber/nitrile latex (NBR 0.8 mm) if there is risk of contact with the glue.



A Take a static mixer out of the adhesive set and put it into the glue gun.

- a) Put on the static mixer.
- b) Rotate the static mixer 90° clockwise until it stops.

B Open the glue gun, insert the cartridge and close it again.

C To mix the glue, activate the glue gun several times and put about 5 cm of glue onto a sheet of paper.

The emitted glue is mixed.

- D Place the glue gun at an angle of about 75° to the adhesive joint.
- E Activate the glue gun and apply slowly and evenly along the adhesive joint.
- F Stop at the center mark.
- G Use a spatula to remove excess glue.
- H Continue the gluing process.
- I Use a spatula to remove excess glue.
- J Continue the gluing process and remove the liquid glue at the end with a spatula.
- K Remove the adhesive tape.
- L Allow the glue to dry for about 30 minutes.

6.18.3.2.8 Complete gluing process

Removing staples



- A Lift the staples with a slotted screwdriver.
- B Pull out the staples with pliers.

Removing adhesive beads

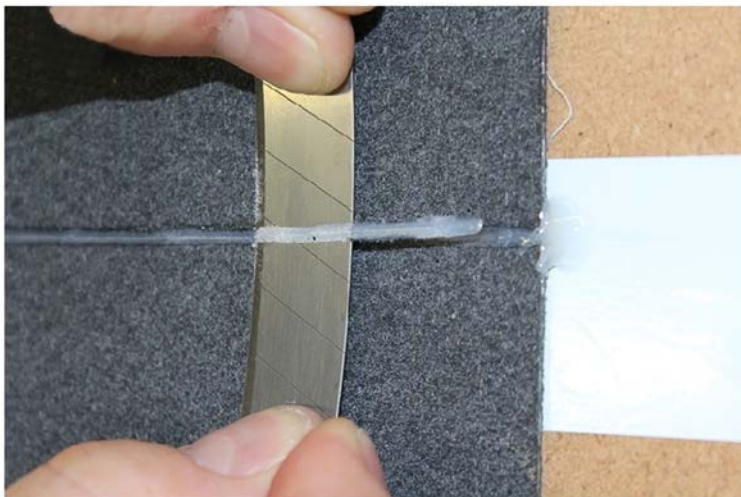
Adhesive beads form if the adhesive joint was not cleanly scraped off with the spatula. This can occur if too many staples are used on the adhesive joint.



Note:

Risk of damage to the conveyor belt.

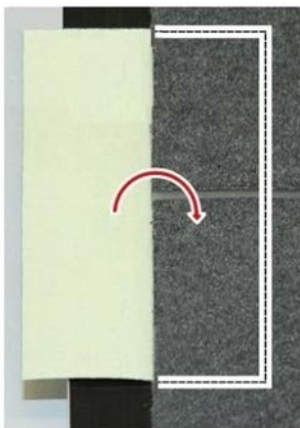
Ensure that the blade slides over the conveyor belt and does not cut the conveyor belt.



A Attach a long blade.

B Carefully pull the blade over the conveyor belt.

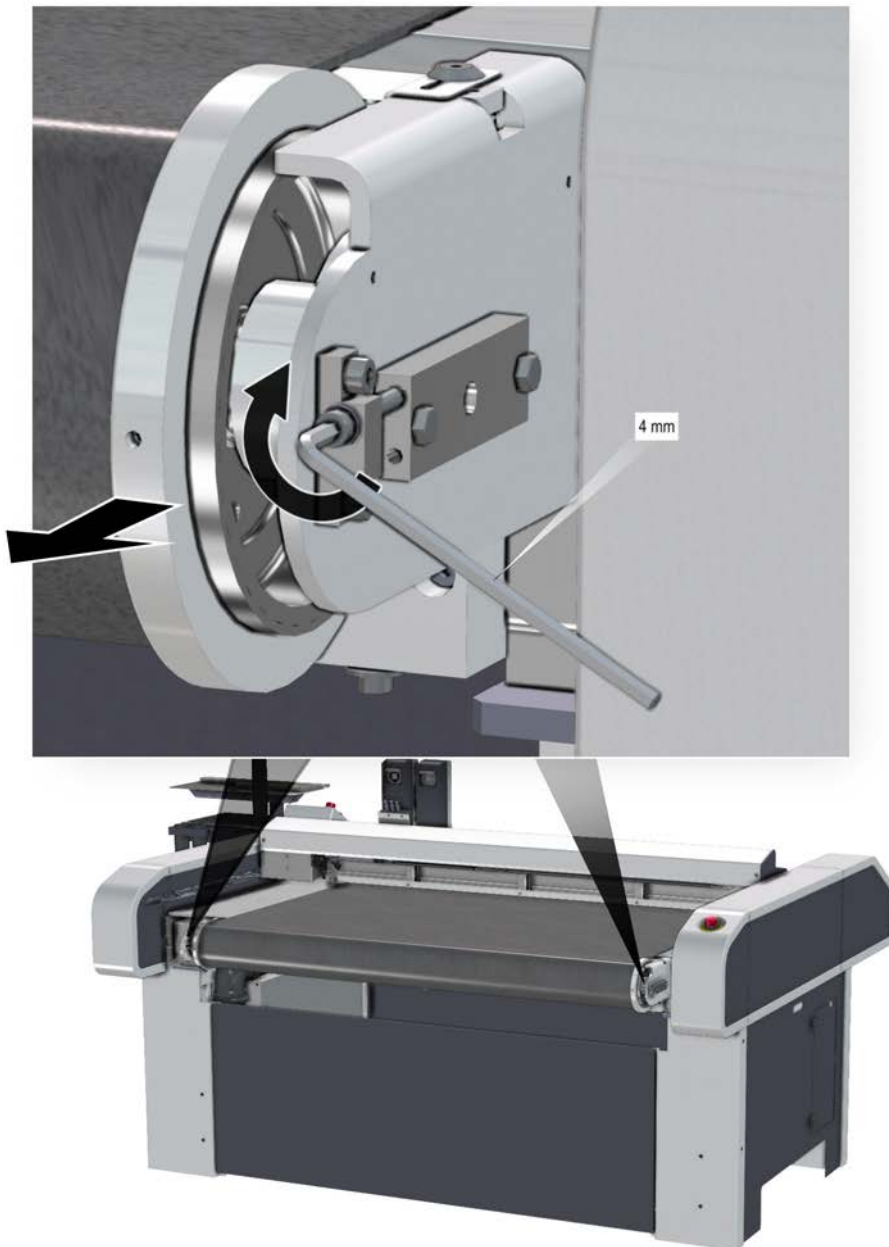
Masking the edges



A Remove the glue residue on the edges of the conveyor belt with a blade.

- B** Remove the tape on the protective film.
- C** Push half of the adhesive tape under the conveyor belt, adhesive side up, and press firmly.
- D** Fold down the other half of the adhesive tape and press it down firmly on the top side of the conveyor belt.
- E** Remove underlay.

6.18.4 Tensioning the conveyor belt



- A** Tighten the tensioning screw.
- B** Repeat the procedure on the other side.
- C** Check the tension.
- D** Manually pull the conveyor belt 1x completely around the table.
- E** Re-check the tension.

6.18.5 Finger guards

Finger guards which cover the gap between the working area and the guide roller and thus prevent the pulling in of body parts and clothing are located on both sides of the guide rollers on all conveyor belts. Adjustable guide rollers have finger guards with slots. These slots can be used to precisely adjust the finger guards if the guide rollers are adjusted for tensioning the conveyor belt.

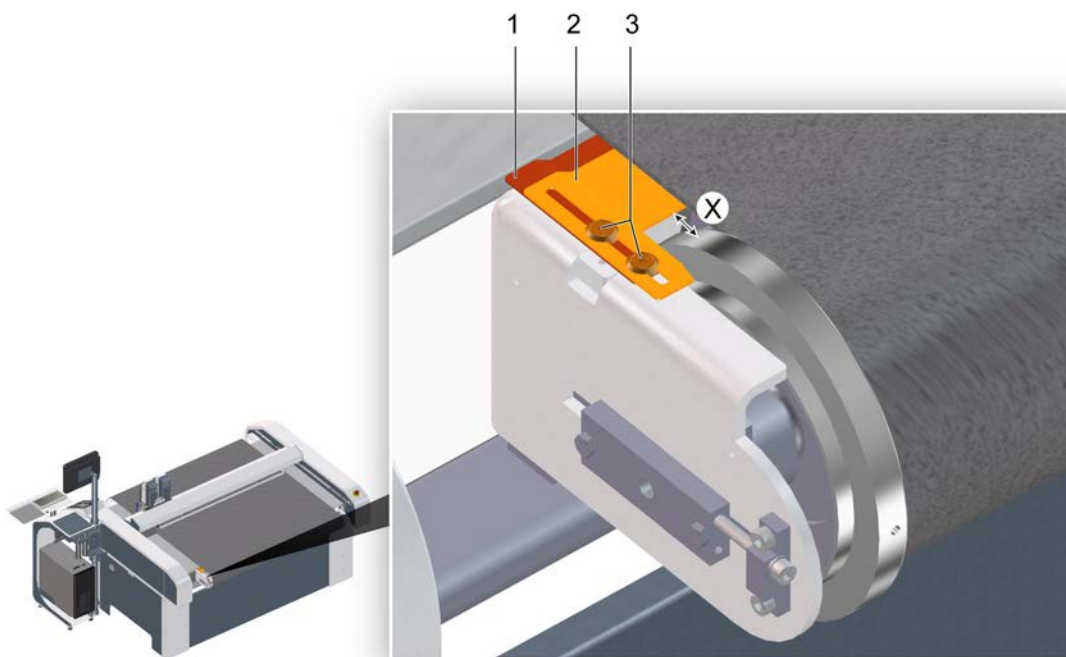
6.18.5.1 Adjusting the finger guard on the adjustable guide roller



Caution:

Risk of injury from incorrectly adjusting the finger guard!

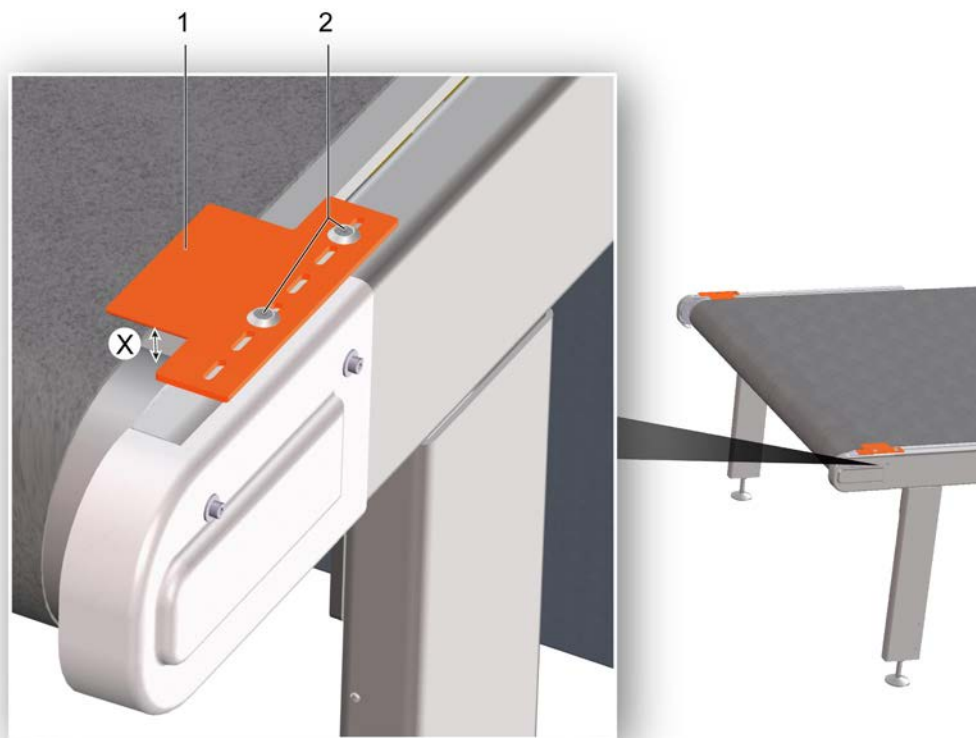
The finger guard prevents the operator from being able to reach between the conveyor belt and guide roller during the feed (moving conveyor belt). For this reason, it is necessary that the finger guard be adjusted correctly. Severe injuries to the fingers may occur if the finger guards are incorrectly adjusted.



- 1 Finger guard, lower section
- 2 Finger guard, upper section
- 2 Screws with washers (2x each)
- X Clearance between finger guard and guide roller

- A** Ensure that the screws are loose or loosen them.
- B** Move the top part of the finger guard until the clearance is $X \leq 6$ mm.
- C** Tighten the screws.
- D** Repeat the process on the other side.

6.18.5.2 Adjusting the finger guard on the guide roller/CE



- 1 Finger guard
- 2 Screws with washers (2x each)
- 3 Clearance between finger guard and guide roller

- A** Ensure that the screws have been loosened, or loosen the screws.
- B** Push the finger guard until the clearance $X \leq$ is 6 mm.
- C** Tighten the screws.
- D** Repeat the procedure on the other side.

6.19 ICC camera, cleaning the lens (optional)



Warning:

Risk of fire & explosion and risk of chemical burns through the use of isopropanol

Isopropanol is highly inflammable and poses a risk to health.

- Keep away from sources of ignition.
- Do NOT inhale the fumes.
- Make sure there is a sufficient supply of fresh air.
- Avoid contact with the skin.
- Wear your personal protective equipment.
- Observe the manufacturer's safety regulations.



Note:

Disposal

Dispose of chemicals and items contaminated with chemicals in accordance with local regulations.

A Removing dust and particles

- a) Blow clean using a puffer.
- b) Use an antistatic brush to clean dust that is hard to remove. Do not touch the tip of the brush with the fingers, otherwise the antistatic brush will lose its effect.

B Remove fingerprints or grease.

- a) Blow clean using a puffer.
- b) Wipe clean using a micro-fibre cloth.
- c) For tough grease spots, use a drop of isopropanol on the micro-fibre cloth.

6.20 Instructions for disposal



Note:

Contact Zünd customer services or your service partner before you dispose of your cutter.



Tip:

Zünd cutters do not contain hazardous substances such as heavy metals, asbestos, batteries, toners, ceramics, radioactive substances or similar. Our cutters are modern industrial devices which correspond to current standards and guidelines for the disposal of old appliances.

- Plastic components > 20 grams are labeled and can therefore be disposed of correctly.
- Steel and plate parts have been varnished with environmentally-friendly varnish or have been powder-coated. Aluminium components have been anodised. They can be disposed of as waste metal.
- PCBs have been soldered with lead-free solder and can be disposed of as electric waste.

You must also observe the following:

- Country-specific legislation and regulations on waste disposal.
- No special measures are generally required when decommissioning the cutter system because no poisonous substances are used.
- Assign a disposal company to remove and recycle the machine correctly.

6.21 Starting up after periods of standstill

**Note:**

Before extended periods of downtime or when starting up your cutter after periods at a standstill, contact the Zünd Customer Service department or your service partner.

Generally, the machine can be started up immediately, even after prolonged periods of standstill. However, some options require running-in routines, which must be heeded in order to ensure continued maintenance-free operation.

6.21.1 Running-in routine 1-9 kW/1-15 kW/1-15 kW plus vacuum turbine

The running-in routine must be carried out after periods of standstill > 6 days.

A Activate all vacuum zones.

B Select **1-8-1-10 Running-in routine** in the menu.

Results

The running-in routine for the vacuum generator starts (duration approx. 8 min). The remaining time will be displayed on the operating unit.

7 Tools

8 Modules

9 Material handling

10 Additional specifications

