# Translation of the original instruction manual





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# Index

1	SERVICING AND MAINTENANCE			
	1.1 DAILY SERVICING (ONCE PER SHIFT)			
	1.2 WEEKLY SERVICING (OR AFTER 7 SHIFTS)			
	1.3 MONTHLY SERVICING			
	1.4 ANNUAL SERVICING			
2	HINT FOR MAINTENANCE OF ROTATED BRISTLE CONVEYOR.			
3	CHANGING MARKING NEEDLES / DRILLS			
4	KNIFE CHANGE			
5	ADJUSTMENT OF THE KNIFE IN THE BRISTLE BELT			
6	ADJUSTMENT OF THE FLEXIBLE CONNECTING ROD OF TURBO	)CUT D2502CV 10		
7	CONROD EXCHANGE AT TURBOCUT D 2502			
8	MAINTENANCE OF THE KNIFE DRIVE			
	8.1 GREASE LUBRICATION			
	8.2 OIL LUBRICATION			
9	LIST OF WEAR AND TEAR PARTS			
10	0 COMPRESSED AIR LUBRICATION FACILITY			
	10.1 REFILL OIL FOR THE COMPRESSED AIR LUBRICATION FACILITY			
	10.2 REMOVING THE WATER FROM THE COMPRESSED AIR UNIT			
11	<b>1 INFORMATION: WEAR AND TEAR PARTS</b>			
12	2 IMPORTANT INFORMATION REGARDING THE SHARPENING DI	EVICE 20		
13	3 EMISSION REGULATIONS			
14	4 SAFETY INSTRUCTIONS			
15	5 TECHNICAL DATA			

## 1 <u>Servicing and maintenance</u>

#### 1.1 Daily servicing (once per shift)

- Control of the knife-width approximately 1 time daily. Compare the actual value with the parameter value and alter if necessary. Adjust the parameter "knife-wear-out-factor" if necessary.
- Check, clean and adjust the knife guidance and check for easy movement.
- Holding down clamp with grinding device and roll-guidance should be cleaned two times daily, if there is strong contamination clean frequently. Wipe off oil remnants and blow with compressed air.
- Clean grinding discs several times daily, according to the degree of contamination. Dirty sharpening discs influence the sharpening result.
- Check the vacuum pressure (start pressure 0,23 bar for the 2x13kW-pump and 0.18 bar for the 15kW pump).
- Eliminate grinding dust at the sharpening device
- Check the knife drive, if an exceptional noise level of the cutting head is noticed.
- Keep the bristle conveyor clean. Execute 2 cleaning cycles daily. (Remove plastic, switch into manual mode and press <Ctrl>+<F4>).
- After changing the knife, check that the knife drops vertically into the low rollguidance and is not deflected. Check that the knife is perfectly installed against the back-roller. Make a cross-stitch-test after changing the knife (MT.ISO).

III Sharpness of the knife and correctly adjusted knife guidance guarantee an optimal cutting result. These points deserve specific attention!!!

• Control and clean any ventilation grilles at the switch control boxes and also at the vacuum pump.

#### 1.2 Weekly servicing (or after 7 shifts)

• Check the bristle segments visually. Replace defective bristle segments.

- Remove water from the compressed air unit. If required do this daily. Check oil level and refill, if necessary.
- Check the knife guidance rollers at the holding down clamp for free movement
- Clean and lubricate the toothed rack and guide elements.
- Check mobility of the X, Y and C-axis in with the cutter switched off. To do this operate emergency-stop switch!
- Check and if necessary clean the vacuum-filter.
- Clean the filter inserts of the control box cooling fan, as well as all input and output filters.
- Grease the piston of the knife drive and the swivel

#### 1.3 Monthly servicing

- Check tooth wheels and tooth rack on mobility (LV-version only)
- Control vacuum with a covered table (Pressure 170 max. 250 mbar !).
- Remove the cutting head cover and clean the cutting-head and the cuttingbridge. Also check that all screws on the cutting-head are fully secure.

#### 1.4 Annual servicing

- Lubricate the guide and support rolls of the cutting bridge until grease comes out.
- Check the drive-chains of the bristle-conveyor. If necessary re-tighten, clean and lubricate.
- Open the maintenance flaps at the front or side of the vacuum chamber for cleaning.

#### 1.5 Every 5 years

• Ask Bullmer customer service to check the complete installation.

# 2 <u>Hint for maintenance of rotated bristle conveyor</u>

Your cutter is equipped with special die cast bristles. The bristle-material is Polyamide 6. It is imperative to keep it clean.

Only cleaning of cut remnants guarantees the lifetime of the bristles. Please check, even if an automatic bristle cleaning is built-in on your installation, that the bristles are uncontaminated.

The bristles should be free to move as the knife passes between them. Check that no cut remnants stay trapped between the bristles. If the bristles are unable to stand upright as result of trapped waste the bristles could be cut leading to premature wear.

#### Note please:

When transporting cut parts on the clearing conveyor, a bristle-cleaning takes place automatically with our cutters, if not worked in the bitefeed mode.

If you have questions to this - please call our customer service.

# 3 Changing marking needles / drills

#### Preparation :

Position the cutting head of the cutter at y=0. You can do this by running a reference, by positioning the machine or by running the machine to zero position.

#### Safety measures:

Activate the emergency stop switch on the control panel.



The drill may not be changed without observing the safety regulations!!!

#### Required tools:

- Drill chuck key (included in delivery)
- Allen key (Size 2)

#### Marking needles to be used:

- Solid or hollow marking needles

(You can find a selection with their part numbers in the parts list)

#### <u>Removal :</u>

Open the marking needle chuck by turning the drill chuck key to the left. Open the grub screw (M 4) for the marking needle on the guiding stand with the Allen key (size 2).

Remove the marking needle on an angle outwards with the guiding bush.

#### Note :

Please note that the guidance bush must also be replaced when changing from a larger to a smaller drill diameter!

The same is true when changing from a solid to a hollow needle.

#### Installation:

Insert the guidance bush with the marking needle into the holder on the stand from above. Insert the shaft of the marking needle upwards into the marking needle chuck and tighten it with the drill chuck key.

Unlock the emergency stop button and restart the Cutter.

# 4 Knife change

#### Preparation:

Bring the cutting-head of the knife to position y=0. Make sure that there are no fabricplies are under the head as the knife and the marking needle(s) will drop into the bristle-mat after removing the air pressure.

#### Attention Security Measures:

- 1. Switch off control
- 2. Operate "emergency-stop"- switch at the control panel



#### Required tools :

- Special Bullmer allen (included in machine delivery)
- Spare knives: Art.-number see spare parts list

#### Remove the knife :

#### Attention: The knife is very sharp! Cutting-danger!

- 1. Open the cover of the cutting head. Turn the C-axis manually until the knife screws are visible. If the knife screws are not visible, move the V-belt of the knife drive until the screws are moved down.
- 2. Remove the knife fixing screws and the old knife

#### Preparation of the knife mounting:

Before the new knife can be installed, it must be checked for symmetry and exact uniformity of the knife-surfaces. Lay the knife on a flat surface to do this. Clean the low-holder guide rollers and the rotary plate of any dust (rag, compressed air).

#### Installing the knife :

- 1. The new knife can now be inserted instead of the old knife into the knifeguidance. Screw the new knife securely. Make sure, that the knife fits closely to the back rolls (lift the plaid to check).
- 2. Unlock the "Emergency-Stop"-Switch.
- 3. The machine can be switched on.

## Note :

Before using the new knife it must be grinded 4 - 5 times.

Press the key "Manual grind ", while in "Manual"-mode. After 4 - 5 grinding cycles end the process by pressing this key again.



# 5 Adjustment of the knife in the bristle belt

In case of the cutter type Turbocut D2502 the depth adjustment is changed over the shock absorber (see documentation spare parts Ident No. 52542). You have to adjust the plunge depth according to the following picture.



Picture 1: Depth adjustment for Turbocut D2502

# 6 Adjustment of the flexible connecting rod of Turbocut D2502CV

Please take care, that the knife drive is programmed with the correct speed (rpm).

Make sure, that the value of the parameter *knife frequency at maximum speed* is not higher than 6000 rpm.

Take also care, that the flexible connecting rod (IdentNo. 108442) is guided through the two bearings (IdentNo. 005382) (see picture at next page).

Please check the distance between the flexible connecting rod and the bearings. It is important, that there is a distance of 0.2mm between the flexible connecting rod and the bearings. If the distance is too small or too big, it could happen, that the connecting rod breaks.

Make sure, that the screws on both sides of the connecting rod are tightened.

# 7 Conrod exchange at Turbocut D2502

#### Security measures:

Press Emergency switch at the control terminal and switch off and vent the compressed air.

(Switch off compressed air at the lubricator unit. Move the knife drive up and down per button until the pressure is reduced.).

First step: Unlock and remove the marked screw (see picture below), keep the area clean from parts of broken conrod.







 move the upper knife guidance away, watch out for his position 1. Remove the 3 Allen screws and take the ring away

The conrod falls down and can be eliminated by easily, if you bend the conrod slightly.

To fix the new conrod straight, please use the support device present in the blue toolbox

After locking the 2 screws, please check the straightness of the conrod again





Now you are ready for reassembling.





Don't forget the washer!!!

#### Schneidkopf

Antrieb mit >Poligon<



# 8 Maintenance of the knife drive

#### 8.1 Grease lubrication

A constant and sufficient grease lubrication of the knife drive is absolutely necessary, to guarantee a long life time.

#### Attention:

Use exclusively Bullmer special grease Id: 068636K.

The guarantee expires if the grease is not used!

You can find grease gun and special grease in the accessories of the machine.



#### Security measures:

Press Emergency switch at the control terminal and switch off and vent the compressed air. (Switch off compressed air at the lubricator unit. Move the knife drive up and down per button until the pressure is reduced.).

#### Instructions:

Above the knife fixing screws you can find the grease nipple (see picture below).



Grease nipple

Clean all grease that exits

Knife fixing screws

To ensure the injection of grease into the space above the piston head, make sure, that the knife is located at the lower dead point, this means that the knife fixing screw is visible.(see picture above).

# Lubricate that grease nipple every two weeks (3 strokes) (single shift operation)

For two- or three shifts, the greasing frequency must be increased accordingly.

Take the grease gun with the special grease from the accessories of the machine, set the knife on the lowest position, place the grease gun on top of the grease nipple (see picture below) and press grease inside until the grease escapes slightly at the knife holder.

Remove the remaining grease with a cloth.



The grease nipple of the eccentric support must also be greased.

#### Security measures:

Press Emergency switch at the control terminal and switch off and vent the compressed air. (Switch off compressed air at the lubricator unit. Move the knife drive up and down per button until the pressure is reduced.). This grease nipple can only be greased if the knife drive is lowered.



Grease that grease nipple every four weeks (3 strokes) (single shift operation)

## 8.2 Oil lubrication (only if there is no grease lubrication)

The correct quantity of oil is set as follows:

There are two marks at the oiler indicated with + and – (see red arrow) Remove the black cover disk first (green arrow). Turn the round knob (blue arrow) in direction – up to the stop. Turn the knob back three steps in + direction. Mechanically the quantity of oil is now defined correctly.

#### Parameter settings:

The parameter "knife frequency for positioning" should be set to 3000 r/min. This frequency is used, if the knife drive is in upper position. The parameter "revolutions until oil injection" is used to define the quantity of lubrication. The parameter should be set to 20000 r/min.

So every 7 min one drop of oil is injected.



Additionally the following maintenance work must be executed minimum once a week:

- Toothed belts and toothed belt wheels must be cleaned (especially the teeth of the wheels and belts).
- The tension of the toothed belts must be checked
- The toothed belt must run straight and must not run to the inside of the flanged wheel.
- Check the wear of the teeth of the toothed belt. If the teeth of the belt are damaged, the toothed belt must be changed.

# 9 List of wear and tear parts

The wear and tear parts of the bullmer knife drive system are marked in the list of wear and tear parts Turbocut D 2502.

- Page 3: Tooth belts, tooth belt wheels and und tensioning roller
- Page 4: Guidance with Polygon (piston)
- Page 5: Mass balance shaft, eccentric bearing and tensioning roller.

# 10 <u>Compressed Air lubrication facility</u>

#### **10.1** Refill oil for the compressed air lubrication facility

#### Safety measure:

- 1) Turn the compressed air to 0 bar using the dial
- 2) Exit the CNC program
- 3) Press the emergency stop switch on the control panel

## The oil must not be changed without observing this safety measure!!!

#### Required tool:

Fork wrench (key width 15).

#### Oil required:

For compressed air-devices suitable acidity-free oil of middle viscosity (acc. ISO 3448).

#### Changing the oil:

Press the viewing glass upwards while turning it to the left with the fork wrench (key width 15). This unlocks the glass and it can now be removed.

Fill up the glass with the new special oil from Bullmer and bring it to the oil level regulator from below while turning the viewing glass to the right with the fork wrench as far as it will go.

Unlock the emergency stop on the control panel.

After having changed the oil return the air pressure to approx. 6 bar with the dial.

#### **10.2** Removing the water from the compressed air unit

#### Required tool:

None

#### Procedure:

Turn rotary-screw to the left and allow any water to run out of the viewing glass. Then retighten the screw.



## 11 Information: wear and tear parts

For our automatic cutting systems you require certain wear and tear parts. We also recommend that you store a few, certain spare parts. These will vary but examples are knife blades, grinding stones, drills etc.

Please plan so that you always hold the wearable parts in stock in sufficient quantity and order replacements in sufficient time so that they are available without delay.

To help, we would like to give you following advice:

#### Wear and tear material:

As consumable material, you require polyethylene cover foil and air permeable paper to put underneath the fabric plies. On the enclosed leaflet, we supply an orderexample and a supplier. With the polyethylene cover foil, also as with the underlay paper, there are different qualities and different strengths. We recommend to you to purchase and try samples from various sources. For example, lighter qualities of polyethylene may be less expensive but prone to tearing when cutting higher plies but may be suitable for lower plies with careful handling.

Please note: If you plot a marker with air-impermeable paper, you can manage with small side stripes of polyethylene!

The underlay paper should have a certain solidity so that especially soft and sensitive material cannot be moved into the bristles.

Please note: You can avoid the need for underlay paper with our cutters with most materials if not worked in the bitefeed - with solid material and the bitefeed underlay paper can also be avoided!

We recommend that you make contact with friendly companies that have used automatic cutting systems for a long time and therefore have experiences and favorable reference-sources.

#### Wear and tear parts:

We have the most important wearable parts on stock in general and these can be delivered quickly.

For certain wearable parts, as well as certain other parts, we work with a standard exchange method and only the actual repair costs are chargeable. Please ask our customer service case to case.

# 12 Important information regarding the sharpening device

#### Important advice for the operation and the cutting quality of your cutter

The grinding device on the cutting head of your cutter is equipped with one diamante grinding disk (Turbocut D 2502) or with two diamante grinding disks (PROCUT D 5001 and D 8001). Also supplied with your cutter is a diamante grinding disk for Turbocut D 2501 and two grinding disks for PROCUT D 5001 and D 8001 with a borax coating.

You can recognize the diamante grinding disks by the fine, somewhat gold-coloured coating and the borax-disks by the coarse charcoal-gray coating.

Diamante disk	IdentNo.	
	105821	

Borax disk Ident.-No. 60588

The diamante grinding disk creates a finer knife grinding, the borax-disk a coarser one.

Because of the smaller, finer knife of the PROCUT M 3001, a diamante grinding disk must always be used for the Turbocut.

#### First of all consider the following:

The bigger you choose the grinding distances, parameterized by contour-meter (Parameter Custom120, minimal grinding distance and Custom121 maximum grinding distance in the parameter dialog box), the longer is the lifespan of your grinding disk. Try to determine the most effective grinding distances for your different materials and ply-heights and fix these in the parameter-sentence. We strongly recommend tests to determine these distances for both optimum cut quality and long disk life.

#### Cleaning advice:

Depending on demand, the type of material being cut and the ply-height, the diamante grinding disks get dirty. The diamante grinding disks must be cleaned regularly and this is made easy with our special-spray:

Spray-bottle	IdentNo.	
	60754	

First, place a piece of paper under the cutting head to prevent contamination of the cutting bed. You briefly spray the diamante grinding disks and then operate the key with the symbol of the rotating diamante grinding disk on the control panel. Through this rotation, the dirt is thrown out from the diamante grinding disk and the disk will be cleaned in seconds.



Attention ! Fire-danger !

With application of combustible cleaning spays or solvents, it is only allowed to operate the installation after thorough airing.

# 13 Emission regulations

# Noise level measurement conditions for cutting machines and systems *directive 2003/10/EG*

"Because it comes to requests, misunderstandings and unclarity in the before mentioned matter again and again we will give the following information which we ask you to note.

These emission regulations are valid especially for our cutter types:

Procut Turbocut ELC

Other products are hardly affected by this.

1. The allowed noise level is

#### max. 85 dB

Noise level over 85 dB are allowed but require the wearing of an ear protection.

- Important is the right method of measurement which is told according to DIN 45635. You have to pay attention that the measurements are done under attention of this direction because deviances will bring wrong results.
- 3. You have to use the following method of measurement: The measurement has to carry out in 1 m horizontal distance from the sound source. Relating to the cutter it means that you have to measure in 1 m horizontal around the utmost border of the cutter and that the highest noise level has to be determined. The measurement height is 1,6 m from the floor (average ear height).

4. Our measurements for the Procut and Turbocut has resulted the following values with switched on vacuum pump, average kerfs generation and switched on knife drive with max. deviation frequency and under consideration of opening the "vacuum valve".

Average noise level at Procut	77 – 80 dB
Noise level at Turbocut	75 – 78 dB

5. The measurement has to carry out with a calibrated and standardized measurement device such as a **sound level meter Voltcraft 329** 

# 14 Safety instructions

Only fully trained and qualified personnel may operate and service the machine.

The commissioning should only be performed by qualified and authorized by the operator and instructed personnel.

If touching into the X/Y/Z drives during the operation of the machine, there is a risk of getting your fingers caught.
Do not touch onto the conveyor belt. The hand or the arm might be overrun by the y-axis of the machine.
Don't lean hand or foot onto the cable tray of the x-axis (at opposite side of the machine). There is a risk of crushing, if the y-axis is moving.
Do not place a hand on the cable tray of the bridge. When machine drives the cutting head to the operator side, the hand could be crushed by the cable chain.
Option mover: When machine is moving laterally, there is a risk of bruising in the area of the feed table.

If a feeding clamp is used, this clamp goes down during bitefeed. Please do not touch into this area. The fingers could be crushed.
The tools, which are installed at the cutting head, are driven cutting tools and drilling and punching tools. By the sharp cutting edges there is a danger of injury by improper handling.
Please keep some distance from the machine. If the y-axis is moving, there is a risk of being bumped.
If connections are wrong or grounding is missing, parts of the housing might be under voltage. Only qualified personnel (electricians) are allowed to connect the machine.
Option Ionisation device: Shock reactions might occur, if the high tension conducting parts are touched. Persons, who stay near to the ionisation device, should wear electrostatically dissipative shoes, to avoid personnel charging by influence. Persons with cardiac pacemakers: Less than 3.5cm distance between chest and the emission tips or an extensive touch of several emission tips can switch the cardiac pacemaker temporarily into error mode.
Option Z-Laser: If a Z-laser is used, do not look into the optical path of the laser.

# 15 Technical Data

Working widths	1600, 1800, 2000, special widths on request
Working lengths	Acc. to execution
Ma. Cutting height	Acc. To execution
	1 ply up to 25mm (under vacuum)
	acc. To material
Working height	approx. 860 mm
Max. positioning speed	acc. to execution (up to 100 m/min)
Max. cutting speed	acc. to execution (up to 100 m/min)
Material support system	acc. to execution
	Bristle segments resp. air permeable cutting
	underlay
Max. acceleration	acc. to execution (Up to $1,5 \text{ g} (1\text{ g} = 9,81\text{ m/s}^2)$ )
Data format	ISO (Gerber-Standard-Data format)
	DXF
Data transmission	Offline (USB Stick, Hard disk)
	Online (network (Ethernet))
Connection values	400 V / 50 Hz
	Special voltages on request
Energy consumption	Vacuum device acc. to execution
	Cutter acc. to execution approx. 4,0 kW
Compressed air consumption	200 l/min at 6 bar
when cutting	
Influence from surroundings	I he voltage in the lines to the control cupboard
	must be stable (max. tolerance +/- 5 % ).
	the environment (rel. numidity and temperature)
	should be adapted to suit the material being
	processed (all conditioning).

Diese Gebrauchsanweisung wurde nach bestem Wissen und Gewissen verfasst und geprüft.

Die Firma bullmer haftet jedoch nicht für eventuelle Irrtümer und behält sich das Recht zu technischen Änderungen ohne Ankündigung vor.

These instructions have been written and checked to the best of our knowledge and belief. However, bullmer will not be liable for errors and reserves the right for changes at any time without notice