



## Tangential creasing tool

# TCT-1

<b>Content</b>	<b>Page</b>
<b>1. General remarks</b>	<b>3</b>
<b>2. Operation and maintenance</b>	<b>4</b>
2.1 Fixation of the processed material	4
2.2 Mounting the processing unit	4
2.3 Mounting the tool holder and the creasing wheel	4
2.4 Reference run and alignment of the creasing wheel	5
2.5 Maintenance	6
<b>3. Technical specifications</b>	<b>7</b>
<b>4. Connector assignment</b>	<b>8</b>
4.1 Remarks to the connector assignment	10
4.2 Stepper motor specifications	11
<b>5. Accessories</b>	<b>12</b>

## 1. General remarks

The TCT-1 is a processing unit for CNC-machines that is generally designed to crease cardboard, corrugated cardboard and thin polypropylene material. Nevertheless it's finally up to the user to test the machinability of respective materials. It's not possible to assure the processability of certain materials because of the wide variety of applications.

The TCT-1 is a processing unit that is designed for the operation on a CNC machine with a closed and safety controlled working space. The manual usage of the unit is not allowed.

### **Important security advise !**



The TCM-3 is intended to be used as a single component within a complete machining system. It is delivered as an incomplete unit that is not able to operate without a specified stepper or servo motor driver. It is strictly forbidden to operate the unit without implementing all necessary safety regulations.

The combination of the cutting unit and the machining system has to be done by an expert only. It is not allowed to put the unit in operation before all necessary and required country-specific safety regulations have been observed and checked carefully.

Only the operator of the facility (i.e. machining system) is responsible for observing all relevant safety regulations.

## 2. Operation and maintenance

### 2.1 Fixation of the material to be processed

The TCT-1 can be used for creasing various materials. It is necessary to fix the material on the processing board. In most cases it is essential to use a vacuum table in combination with a special air-permeable mat (Art.-No. 230200).

### 2.2 Mounting the processing unit

The processing unit can be installed to the machining system similar to a conventional milling motor because of its 43mm clamp collar. It is strictly required to observe the machine builders mounting instructions to prevent the unit from loosening or turning out of position.

### 2.3 Mounting the tool holder and the creasing wheel

The tool holder has to be mounted to the 16mm axis carefully. A headless screw fixes it on the Weldon-surface. The creasing wheel itself is inserted in the slot of the tool holder fixed by a cylinder head screw.

The processing unit is designed for using specialized creasing wheels. Any other or additional employment is not according to the intended use.



**Important security advise !**

The blades may only be replaced if it is ensured that no actuator or drive motor of the processing system or the machining system can move. Therefore it is necessary to shut off the machining system or to remove the processing unit mechanically and electrically. It is strongly advised to observe the safety regulations of the respective machine manufacturer.

There is a high risk of injury to hands and fingers.

**2.4 Reference run and alignment of the creasing wheel**

Before using the tool it is required to perform a reference run of the machining system to ensure that the wheel is adjusted to the creasing direction. In most cases it is necessary to parameterize an offset.

This is a function of the respective machine control. For example, proceed as follows:

1. Do a reference run to the internal switch of the processing unit.
2. Check the wheel's position.
3. If the creasing wheel is not yet adjusted to the correct direction, it is necessary to parameterize an offset for the rotating axis of the processing unit.

**Warning !**

If the creasing wheel is not adjusted correctly by an offset value several components could be damaged seriously (e.g. the work piece, the cutting mat, the creasing wheel, the machining system or the processing unit).

## 2.5 Maintenance

The processing unit has to be checked and cleaned periodically. Blunt wheels have to be replaced immediately, since they negatively affect the processing results, increase the load on the kinematics and shorten the lifetime of wear parts.

### **Warning !**



Before carrying out any maintenance work it is necessary to ensure that no actuator or drive motor of the processing system or the machining system can move. Therefore it is essential to shut off the machining system or to remove the processing unit mechanically and electrically. It is strongly advised to observe the safety regulations of the respective machine manufacturer. There is a high risk of injury because of moving parts and sharp creasing wheels.

### 3. Technical specifications

	Tangential creasing tool TCT-1	
	stepper motor	servomotor
Height approx.	192 mm	219 mm
Width approx.	58 mm	
Depth approx.	86 mm	
Distance from center clamp collar to back side of body appr.	29 mm	
Weight (approx.)	2.500g	
Diameter of clamp collar	43 mm	
Tool holder	16 mm-h7	
Tool orientation	by Weldon clamping surface	
Turning range	360 degrees, turning range not arrested, possibility of continuous circular operation	
Connector	Sub-D 25 pins	Sub-D 25 pins + connector for power supply of servomotor
Power supply for electronics	12V-DC	
Control of actuator	external stepper driver (not included in delivery)	external servo driver (not included in delivery)

## 4. Connector assignment

The following table 1 shows the assignment of the integrated 25-pin D-Sub connector.



### Important security advise !



The mechanical and electrical combination of the cutting unit and the machining system has to be done by an expert only. It is not allowed to put the unit in operation before all necessary and required country-specific safety regulations have been observed and checked carefully. Only the operator of the facility (i.e. machining system) is responsible for observing all relevant safety regulations.



**Table 1: Connector assignment**

PIN	Cable colour	Function / description	Remark																																																															
1	red	+12V electronics for position sensor and optional motor cooler	A																																																															
2	brown	Relay PIN 4	B																																																															
3	blue	Relay PIN 5																																																																
4	not assigned																																																																	
5																																																																		
6	blue-white	<table border="1"> <thead> <tr> <th colspan="4">TYPE OF CONNECTION (EXTERN)</th> <th colspan="2">MOTOR</th> </tr> <tr> <th rowspan="2">UNIPOLAR</th> <th colspan="2">BIPOLAR</th> <th rowspan="2">PARALLEL</th> <th rowspan="2">LEADS</th> <th rowspan="2">WINDING</th> </tr> <tr> <th>1WINDING</th> <th>SERIAL</th> </tr> </thead> <tbody> <tr> <td>A —</td> <td>A —</td> <td>A —</td> <td>A —</td> <td>BLK</td> <td>A</td> </tr> <tr> <td>COM —</td> <td>A —</td> <td>—</td> <td>—</td> <td>BLK/WHT</td> <td>A\</td> </tr> <tr> <td>A\ —</td> <td>—</td> <td>A\ —</td> <td>A\ —</td> <td>GRN/WHT</td> <td>—</td> </tr> <tr> <td>B —</td> <td>B —</td> <td>B —</td> <td>B —</td> <td>GRN</td> <td>B</td> </tr> <tr> <td>COM —</td> <td>B —</td> <td>—</td> <td>—</td> <td>RED</td> <td>B\</td> </tr> <tr> <td>B\ —</td> <td>—</td> <td>B\ —</td> <td>B\ —</td> <td>RED/WHT</td> <td>—</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>BLU/WHT</td> <td>—</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>BLU</td> <td>B\</td> </tr> </tbody> </table>		TYPE OF CONNECTION (EXTERN)				MOTOR		UNIPOLAR	BIPOLAR		PARALLEL	LEADS	WINDING	1WINDING	SERIAL	A —	A —	A —	A —	BLK	A	COM —	A —	—	—	BLK/WHT	A\	A\ —	—	A\ —	A\ —	GRN/WHT	—	B —	B —	B —	B —	GRN	B	COM —	B —	—	—	RED	B\	B\ —	—	B\ —	B\ —	RED/WHT	—					BLU/WHT	—					BLU	B\	C
TYPE OF CONNECTION (EXTERN)				MOTOR																																																														
UNIPOLAR	BIPOLAR			PARALLEL	LEADS	WINDING																																																												
	1WINDING						SERIAL																																																											
A —	A —			A —	A —	BLK	A																																																											
COM —	A —			—	—	BLK/WHT	A\																																																											
A\ —	—			A\ —	A\ —	GRN/WHT	—																																																											
B —	B —			B —	B —	GRN	B																																																											
COM —	B —			—	—	RED	B\																																																											
B\ —	—			B\ —	B\ —	RED/WHT	—																																																											
						BLU/WHT	—																																																											
						BLU	B\																																																											
7																																																																		
8	red																																																																	
9																																																																		
10	green-white																																																																	
11																																																																		
12	black																																																																	
13																																																																		
14	black	0V electronics for position sensor and optional motor cooler	A																																																															
15	yellow	Relay PIN 3	B																																																															
16	not assigned																																																																	
17																																																																		
18	blue	<table border="1"> <thead> <tr> <th colspan="4">TYPE OF CONNECTION (EXTERN)</th> <th colspan="2">MOTOR</th> </tr> <tr> <th rowspan="2">UNIPOLAR</th> <th colspan="2">BIPOLAR</th> <th rowspan="2">PARALLEL</th> <th rowspan="2">LEADS</th> <th rowspan="2">WINDING</th> </tr> <tr> <th>1WINDING</th> <th>SERIAL</th> </tr> </thead> <tbody> <tr> <td>A —</td> <td>A —</td> <td>A —</td> <td>A —</td> <td>BLK</td> <td>A</td> </tr> <tr> <td>COM —</td> <td>A —</td> <td>—</td> <td>—</td> <td>BLK/WHT</td> <td>A\</td> </tr> <tr> <td>A\ —</td> <td>—</td> <td>A\ —</td> <td>A\ —</td> <td>GRN/WHT</td> <td>—</td> </tr> <tr> <td>B —</td> <td>B —</td> <td>B —</td> <td>B —</td> <td>GRN</td> <td>B</td> </tr> <tr> <td>COM —</td> <td>B —</td> <td>—</td> <td>—</td> <td>RED</td> <td>B\</td> </tr> <tr> <td>B\ —</td> <td>—</td> <td>B\ —</td> <td>B\ —</td> <td>RED/WHT</td> <td>—</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>BLU/WHT</td> <td>—</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>BLU</td> <td>B\</td> </tr> </tbody> </table>		TYPE OF CONNECTION (EXTERN)				MOTOR		UNIPOLAR	BIPOLAR		PARALLEL	LEADS	WINDING	1WINDING	SERIAL	A —	A —	A —	A —	BLK	A	COM —	A —	—	—	BLK/WHT	A\	A\ —	—	A\ —	A\ —	GRN/WHT	—	B —	B —	B —	B —	GRN	B	COM —	B —	—	—	RED	B\	B\ —	—	B\ —	B\ —	RED/WHT	—					BLU/WHT	—					BLU	B\	C
TYPE OF CONNECTION (EXTERN)				MOTOR																																																														
UNIPOLAR	BIPOLAR			PARALLEL	LEADS	WINDING																																																												
	1WINDING						SERIAL																																																											
A —	A —			A —	A —	BLK	A																																																											
COM —	A —			—	—	BLK/WHT	A\																																																											
A\ —	—			A\ —	A\ —	GRN/WHT	—																																																											
B —	B —			B —	B —	GRN	B																																																											
COM —	B —			—	—	RED	B\																																																											
B\ —	—			B\ —	B\ —	RED/WHT	—																																																											
						BLU/WHT	—																																																											
						BLU	B\																																																											
19																																																																		
20	red-white																																																																	
21																																																																		
22	green																																																																	
23																																																																		
24	black-white																																																																	
25																																																																		

**The notes following on the next page must be observed carefully.**

**4.1 Remarks to the connector assignment**

Remark	Description
A	The electronic system for the position sensor has to be supplied with a direct current of 12V (DC). The polarity must be respected carefully because otherwise electronics and/or fan may be damaged.
B	<p>The position sensor controls an integrated relay that can be used by the supervising CNC controller as a limit or reference switch:</p> <ul style="list-style-type: none"> <li>• Once the blade has reached the homing point during a reference run, there is contact between <b>PIN3</b> and <b>PIN15</b> of the Sub-D connector.</li> <li>• If the blade is located outside the reference position, there is contact between <b>PIN2</b> and <b>PIN15</b> of the Sub-D connector.</li> <li>• Depending on the applied CNC controller, the integrated relay can be used as a normally closed switch (NC) or as a normally open switch (NO).</li> </ul>
C	The connection of the stepper motor depends on the driver used. The following documentation has to be observed carefully.

**Warning !**



The electrical and mechanical connection of the processing unit has to be done with utmost accuracy by an expert only. It is not allowed to put the unit in operation before all necessary and required country-specific safety regulations have been observed and checked carefully. Only the operator of the facility (i.e. machining system) is responsible for observing all relevant safety regulations.

**4.2 Stepper motor specifications**

SPECIFICATION	CONNECTION		BIPOLAR		PERMISSIBLE RADIAL+AXIAL FORCE ROTOR SPRING-MOUNTED IN AXIAL DIRECTION
	UNIPOLAR OR BIPOLAR-1 WINDING	BIPOLAR SERIAL	BIPOLAR PARALLEL	PARALLEL	
VOLTAGE (VDC)	4.8				
AMPS/PHASE	2.0	1.41		2.82	
RESISTANCE/PHASE (Ohms) @25°C	2.4±10%	4.8±10%		1.2±10%	
INDUCTANCE/PHASE (mH) @1KHz	5.1±20%	20.4±20%		5.1±20%	
HOLDING TORQUE (Nm) [lb-in]	1.2 [10.62]	1.7 [15.02]		1.7 [15.02]	
DETECT TORQUE (Nm) [lb-in]		0.068 [0.602]			
STEP ANGLE (°) ± ACCURACY		1.8±5% (NON-ACCUM)			
BACK-EMF (V) (300 U/min)		29.60			
ROTOR INERTIA (Kg-m²) [lb-in²]		4.8x10 <sup>-5</sup> [0.164]			
WEIGHT (kg) [lb]		1.0 [2.2]			
TEMPERATURE RISE: MAX.80°C (MOTOR STANDSTILL; FOR 2 PHASE ENERGIZED)					
AMBIENT TEMPERATURE -10~ 50°C [14F ~ 122F]					
INSULATION RESISTANCE 100 MOhm (UNDER NORMAL TEMPERATURE AND HUMIDITY)					
INSULATION CLASS B 130° [266F]					
DIELECTRIC STRENGTH 500VAC FOR 1 MIN. (BETWEEN THE MOTOR COILS AND THE MOTOR CASE)					
AMBIENT HUMIDITY MAX. 85% (NO CONDENSATION)					

AXIAL-FORCE Fo (N)	5	10	15	20
DISTANCE a (mm)	130	90	70	52
RADIAL-FORCE Fr (N)	0.08	0.02		
SHAFT PLAY (mm)	4.5			
AT LOAD MAX: (N)	4.5			

AXIAL	RADIAL
0.08	0.02
4.5	4.5

WIRING DIAGRAM

WINDING

CONNECTOR PIN NO./A	LEADS	WINDING
1	BLK	A
3	BLK/WHT	A
2	GRN/WHT	A
4	GRN	A
5	RED	B
7	RED/WHT	B
6	BLU/WHT	B
8	BLU	B

TYPE OF CONNECTION (EXTERN)

UNIPOLAR	BIPOLAR	
	TWINDINGS	SERIAL PARALLEL
A	A	A
A	A	A'
B	B	B
B	B	B'

FULL STEP 2 PHASE-Ex.

STEP	A	B	A'	B'
1	+	+	-	-
2	-	+	+	-
3	-	-	+	+
4	+	-	-	+

WHEN FACING MOUNTING END (X)

	CCW	CW
1	+	-
2	-	+
3	+	-
4	-	+






  





SCALE FREE	APVD
X ±0.5	CHKD
1PL ±0.2	DRN
2PL ±0.1	SIGNATURE
ANGLE ±30'	

TECHNICAL DATE	09.04.08	J.W.
PIN-Belegung	04.01.08	J.W.
DESCRIPTION	DATE	APVD

**5. Accessories**

Article No.	Description	
260010	Tool holder type KR for creasing wheels with ball bearings (image includes creasing wheel)	
260110	<b>B12</b> Creasing wheel for cardboard <b>2pt</b> D=24mm; equipped with 2 ball bearings	
260120	<b>B14</b> Creasing wheel for cardboard <b>3pt</b> D=24mm; equipped with 2 ball bearings	
260130	<b>B16</b> Creasing wheel for cardboard <b>4pt</b> D=24mm; equipped with 2 ball bearings	
260210	<b>B22</b> Creasing wheel for corrugated cardboard <b>type E / type F (E/F flute)</b> D=24mm; equipped with 2 ball bearings	

<p>260220</p>	<p><b>B24</b> Creasing wheel for corrugated cardboard <b>type B (B flute)</b> D=24mm; equipped with 2 ball bearings</p>	
<p>260230</p>	<p><b>B26</b> Creasing wheel for corrugated cardboard <b>type C (C flute)</b> D=24mm; equipped with 2 ball bearings</p>	
<p>260310</p>	<p><b>B32</b> Creasing wheel for <b>polypropylene</b>; D=24mm; equipped with 2 ball bearings</p>	
<p>230200</p>	<p>Long life cutting mat EC-4; intended to be used on vacuum tables; useable on both sides</p> <p>Material Thickness : 4mm Roll width : 2000 mm Colour : grey</p>	 <p><b>ECOCAM EC4</b> Luftdurchlässige Dauer-Schneideunterlage Durable cutting mat - permeable to air</p>