



Zfx™ Inhouse5x

User Manual



Zahn success formula

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1. Basic information

1.1 Intended use

Zfx™ Inhouse5x is a 5-axis milling machine for the production of dental restorations utilizing conventional milling techniques.

The Zfx Inhouse5x is intended for:

- Milling of Zirconium, PMMA, Wax, CoCr, Titanium and Glass ceramic provided exclusively by Zfx and machined following the Zfx processes.

When machining highly flammable materials, it is absolutely necessary to add/install an automatic or manual fire alarm and extinguishing system.

The operator must be familiar with the operation of the entire system and follow the procedures as outlined in this manual. Any other use of the system is considered to be improper.

Zfx assumes no liability for any damages resulting from improper use, not following approved Zfx processes or using non-Zfx materials/Zfx approved materials. The intended use also includes the observance of the safety instructions including all attachments.

Unattended operation of the Zfx Inhouse5x is prohibited. Zfx assumes no liability from any resulting damage.

In the event of fire or explosion the following should be observed:

Minimizing hot surfaces and "other sources of ignition":

- In most cases fire is caused by sparks or over-heated tools or milling materials. Reliable and adequate cooling is required. Only use Zfx approved cooling liquid (article number ZFX02002077 - Zfx™ Cutting Oil for Zfx™ Inhouse5x). The irrigation nozzle should be adjusted correctly.
- In general, tools should be checked regularly and replaced routinely. Safety-critical conditions can be detected through a routine monitoring process.

Vacuum system and ventilation:

To reduce an accumulation of flammable and potentially explosive cooling liquid fumes the immediate area work should be ventilated.

A continuous negative pressure inside the mill should be maintained to prevent cooling liquid aerosols and vapors from escaping.

Extinguishing materials:

The appropriate type of extinguisher should be used for flammable coolant liquid fires:

- Extinguishing gases (oxygen-displacing gases such as CO₂, N₂)
- Foam
- Powder of fire classes ABC or BC (oil fires in accordance to the fire class B)

Metal fires (e.g., Mg, Al, Ti) cannot be extinguished with fire class A, B and C extinguishing materials! Noble gases (for example argon) and fire class D powdered extinguishing materials should be utilized.

Staff training and staff response in case of fire:

The employer shall instruct the employees in accordance to the requirements of the Occupational Safety and Health Act and the Accident Prevention Regulation. Instructions should be reviewed and practice drills conducted at suitable time intervals (at least once a year).

When working on machines with flammable coolants, training should address aspects related to fire and explosion protection/safety.

1.2 Transport Damage

In case of outward damage of the packaging at the time of delivery, customers should proceed as follows:

1. The recipient documents the loss or damage. The product and packaging are to be left unaltered and unopened.
2. The product is not to be used.
3. The damage is to be communicated to Zfx GmbH (contact information Zfx GmbH on Page 1).
4. The damaged product should not be sent back without prior authorization from Zfx GmbH.

If the product is damaged without recognizable damage to the packaging at the time of delivery, please proceed as follows:

1. The damage is to be communicated without delay to Zfx GmbH (contact information Zfx GmbH on Page 1).
2. The product and packaging are not to be altered.
3. The product and packaging are not to be used.

Please Note!

In case of the recipient violating any obligation indicated above, the damage is to be considered as having occurred after delivery (as set forth in ADSp. Art. 28 / CMR law, Chapter 5, Art. 30).

1.3 Content of this manual

- Chapter 1 contains general advice about the system
- Chapter 2 contains security information about the system
- Chapter 3 provides information on the technical data and the structure of the system
- Chapter 4 provides information on the implementation and installation of the system
- Chapter 5 describes the handling of the system
- Chapter 6 provides information on trouble-shooting problems that might occur
- Chapter 7 provides information on maintenance
- Chapter 8 provides information about the disposal of the system
- Chapter 9 contains general information for the user

These operating instructions should be maintained for the duration of use of the device.

2. Safety instructions



Attention!

Please read this operating manual carefully before attempting to connect or operate the machine! As with all technological systems, also with this machine reliability and impeccable operation can only be guaranteed if the standard security measures and the specific safety instructions in this manual are followed.

1. The installation and set-up of the machine must be done by an authorized Zfx™ Inhouse5x technician.
2. The machine can only be used in accordance to the instructions in this operating manual. It excludes all liability arising from the use of the machine for other applications.
3. Please do not connect the machine to power sources of a different voltage or frequency than indicated on the machine label. Instructions and warnings attached to the components are to be followed closely. Any unplugging or connecting of cables during active system operation is strictly prohibited.
4. To avoid electric shock, do not introduce objects in the machine except for the intended replacement of parts in accordance to these operating instructions.
5. Before performing maintenance, always disconnect the unit from the electric source.
6. The integrated control cabinet in the back of the machine should only be opened when the power plug is disconnected. The control cabinet and the right side door can only be opened by a qualified electrician or by a specially trained person.
7. Never use the machine in a location where there is a risk that water or other liquids can enter into the electrical panel.
8. The floor below the machine must be stable. Please take note of the allowable load of your floor.
9. The opening of the housing and machine repairs must be done only by authorized Zfx™ Inhouse5x technicians.

10. Please note that a milling tool mounted in the spindle is an injury risk.
11. The milling machine can only be used with original accessories or accessories approved by Zfx GmbH. Zfx GmbH does not take on any support queries for problems resulting from the use of non-approved nor non-original spare parts.
12. The milling machine must not be installed in hazardous areas.
13. Avoid damage to the power lines as well as the risk of tripping over cords.
14. In case of a change on the milling machine or parts of it, without the written permission of Zfx GmbH, the validity of the EC declaration of conformity is void.
15. Avoid inhaling the dust created during the cleaning process of the machine.
16. The collection tray below the Vacuum filter has a weight of about 5 kg. Please consider this when you remove and reinsert the chip tray.
17. Clean the machine only with approved cleaning supplies.

Explanation of symbols used:



Warning, dangerous electrical voltage! There is a danger of electric shock!



Caution, risk of injury to the hands! Fingers can be crushed between the sliding door and the housing of the machine. There is a risk of injury to the hands!



Caution, risk of injury to the hands! The movement of the machine axes behind the tool magazine can cause crushing or breaking of your fingers. There is a risk of injury to the hands!

2.1 Dangers when handling coolants and lubricants

18. Do not use coolants and lubricants which produce flammable or explosives gases.
19. Do not use mixtures of different coolants and lubricants.
20. Do not store flammable liquids near the machine.

Note: Follow the instructions of the manufacturer for different coolants and lubricants.

2.2. Safety instructions

The machine is equipped with an emergency stop switch. It is located on the right side of the machine.

If the emergency stop switch is turned to "0/OFF", all sources for the individual components are interrupted.

To bring the machine back in operation, the emergency stop switch must be turned to position "1/ON".

Note: The power supply is still active after actuating the emergency stop switch. This also applies to the electrical panel of the machine. The power supply can only be cut off by unplugging the power cable.

3. Description

This is a high precision milling machine (5-axis system) controlled by a computer. It is used for the automatic production of dental prostheses. The machine is suitable for 5-axis simultaneous machining (wet and dry). It is designed and equipped with a high-frequency spindle, so a fast and cost-effective production process is guaranteed.

The Zfx™ Inhouse5x has a tool magazine with 28 milling tools. The milling tools are loaded automatically.

The machine enables continuous and unattended operation, even at night or on weekends, therefore, provides an economical utilization.

The operation of the machine occurs through a built-in PC with touch screen.



Picture 1. Zfx™ Inhouse5x

13.07.2015
16:21:14

M	Axes		Actual	Lag distance	Distance to go
	X	mm	0.000	0.000	0.000
	Y	mm	0.002	0.000	0.000
	Z	mm	0.000	0.000	0.000
	A	°	0.033	0.000	0.000
	B	°	-29.990	0.000	0.000

Override

S 0% 100% 120%

F 0% 100% 120%

Feed m/min
Act: 0.00 0.00

Spindle RPM
Actual: 0

Technology Data

M
G G0 G17 G40 G52 G54 G260 G90 G150 G12
S
T 0
H

Actives program:

Program C:\CNC\20150713_1523\BIO_18_01_5x_20150713_1523.nc

```

%
N1 (BIO_18_01_5x_20150713_1523)
N2 (DATUM 2015.07.13 - 15.26)
N3 G40 G17 G90
N4 G80
N5 (BIO_18_01_5x_20150713_1523.nc)
N6 (OPERATION 1)
N7 (I: ROUGHING CAVITY SIDE (T20) (3D-SCHRUPPEN AUF BELIEBIGEM ROHTEIL))
N8 (IH_ZI_KF_D2.0/4 L20/25)
N9 L Messtaster_WZL.nc
N10 T20 M06
N11 (ToolID: 20)
N12 (ToolTyp: BALLMILL)
N13 (Toolcomment: IH_ZI_KF_D2.0/4 L20/25)
N14 (Tool Ø: 2)
N15 S20000 M3
N16 G85
N17 G54
N18 M150 M147=500500
N19 G0 G90 B0. A180.
N20 X5.1963 Y-12.9657
N21 Z19.15
N22 G82
N23 Z11.1495
N24 G01 Z9.1495 F2500.
N25 X5.252 Y-12.6544 Z9.0344 F2500.
N26 X3.9048 Y-12.5241 Z8.5418
N27 X3.7365 Y-12.4975 Z8.4798
          
```

Techno Block Search Syntax Check TeachIn

F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12

Mode Start Stop Reset Delete Failure Manual Functions clamping Back

Picture 2. User interface> Main menu

3.1 Technical specifications

3.1.1 Input connections (Details on chamber 4.1)

Line voltage	200-240 V AC +/- 10%	100-120 V AC
Rated frequency	50 Hz	60 Hz
Rated current	1,3 A – 2,7 A	0,80 – 2,3 A
Power rating	0,23 kW – 0,25 kW	0,22 kW – 0,26 kW
Fuse (external)	10 A	10 A
Network connector	LAN RJ45 (NC-Data interface)	LAN RJ45 (NC-Data interface)
Interfaces	USB interface for the control of the machine	USB interface for the control of the machine
Air pressure	6,5 bar	6,5 bar
Amount of air	250 l/min	250 l/min
Air purity level	Class 344 DIN ISO 8573-1	Class 344 DIN ISO 8573-1

3.1.2 Size and weight

Width	695 mm
Height	1673 mm
Height (open door)	2060 mm
Depth	1161 mm
Weight	330 kg

3.1.3 Environment / Installation Conditions

Operating temp. range	18-25 °C
Relative humidity	90%, non- condensing
Installation category	II
Degree of pollution	2

3.1.4 Protection Class

Protection Class	Machine IP 20
------------------	---------------

3.1.5 Continuous sound level at the workplace

Continuous sound pressure level	65 dB (A)
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We reserve the right to make technical changes.

3.2 Tool magazine

The tool magazine is located on the right side of the milling workspace.



Picture 3. Tool magazine

The tool magazine contains a total of 28 milling tools. Adding new milling tools or removing used milling tools into the tool magazine can be done through the program “Tool Magazine”.

In this program, the current milling tool is automatically stored in the tool magazine and replaced with a pin setting. Afterwards, the machine automatically moves to a position that allows you to load the milling tool from the magazine. For loading and unloading of milling tools, the protective cover of the magazine is open.

For more information, see Section 5.4

3.3 Vacuum

The Vacuum system is integrated in the machine frame (Picture 4).



Picture 4. Vacuum



Picture 5. Suction filter for Zfx™ Inhouse5x

To ensure a proper performance of the integrated Vacuum system, the filter should be cleaned regularly. The milling particles falls into the specially designed chip tray. The chip tray must be emptied regularly. For this purpose remove and empty the chip tray, then reinsert it into the machine.

Note: The chip tray has a weight of about 5 kg. Please consider this when you remove it and reinsert. When emptying the chip tray, avoid inhalation of milling particles. Damage to the filter (e.g. a tear, etc), can lead to particle build-up and potentially clog up the machine. The proper condition of the filter must therefore be guaranteed. In case of damage notify the Zfx™ Inhouse5 Support & Service.

3.4 Universal clamping system

The clamping system holds the milling material (Blankholder, Single Blockholder, Multi-Blockholder for Zfx™ Inhouse5x) during the milling process and is connected to the rotary A- and B-axes.

The 160° rotation of the B-axis and the 360° rotation of the A-axis makes it possible to machine the top and bottom of the milling material.

Furthermore, the A- and B-axes can be angled for allowing milling of complex geometries.







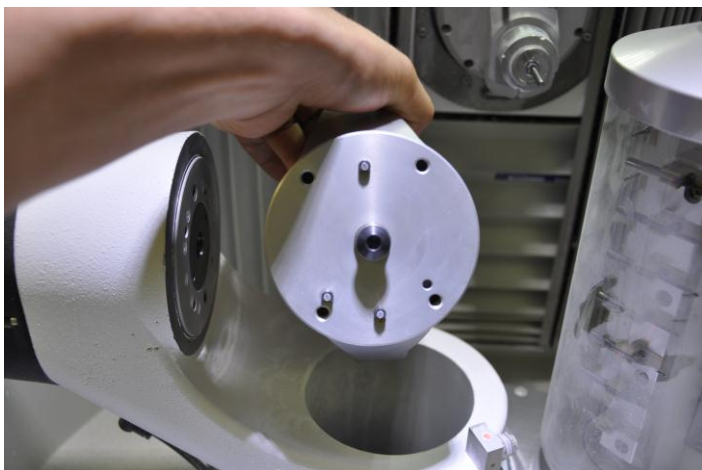
Picture 6. Universal clamping system




Picture7. Blankholder for Zfx™ Inhouse5x
The insertion of the the Blankholder for Zfx™ Inhouse5x:

	<p><i>The door must be open!</i></p>
--	---

- Bring all axes in home position with the button  and  .
- Open the door with the button  .
- Press the button  for minimum 5 seconds to open the clamping system.
- Insert the holder only in the following position



- Press the button  again for minimum 5 seconds to close the clamping system and close the door

3.5 Control unit

The control unit is located in the rear of the machine. The integrated computerized control unit is used to control the milling machine.

The element for handling the machine is the touch display. It displays information and service messages, errors and suggestions.

3.6 Transportation and storage

Note: The Zfx™ Inhouse5x is a high-precision milling machine. Transportation and installation can only be performed by trained personnel. Therefore, if necessary, contact the Zfx™ Inhouse5x Support & Service team.

4. Installation and putting into operation

For this milling machine the environmental conditions complying with the installation category II and pollution degree 2 are valid. The unit is suitable for operation up to an altitude of 2000 m above sea level.

The milling machine is designed to be used in closed spaces.

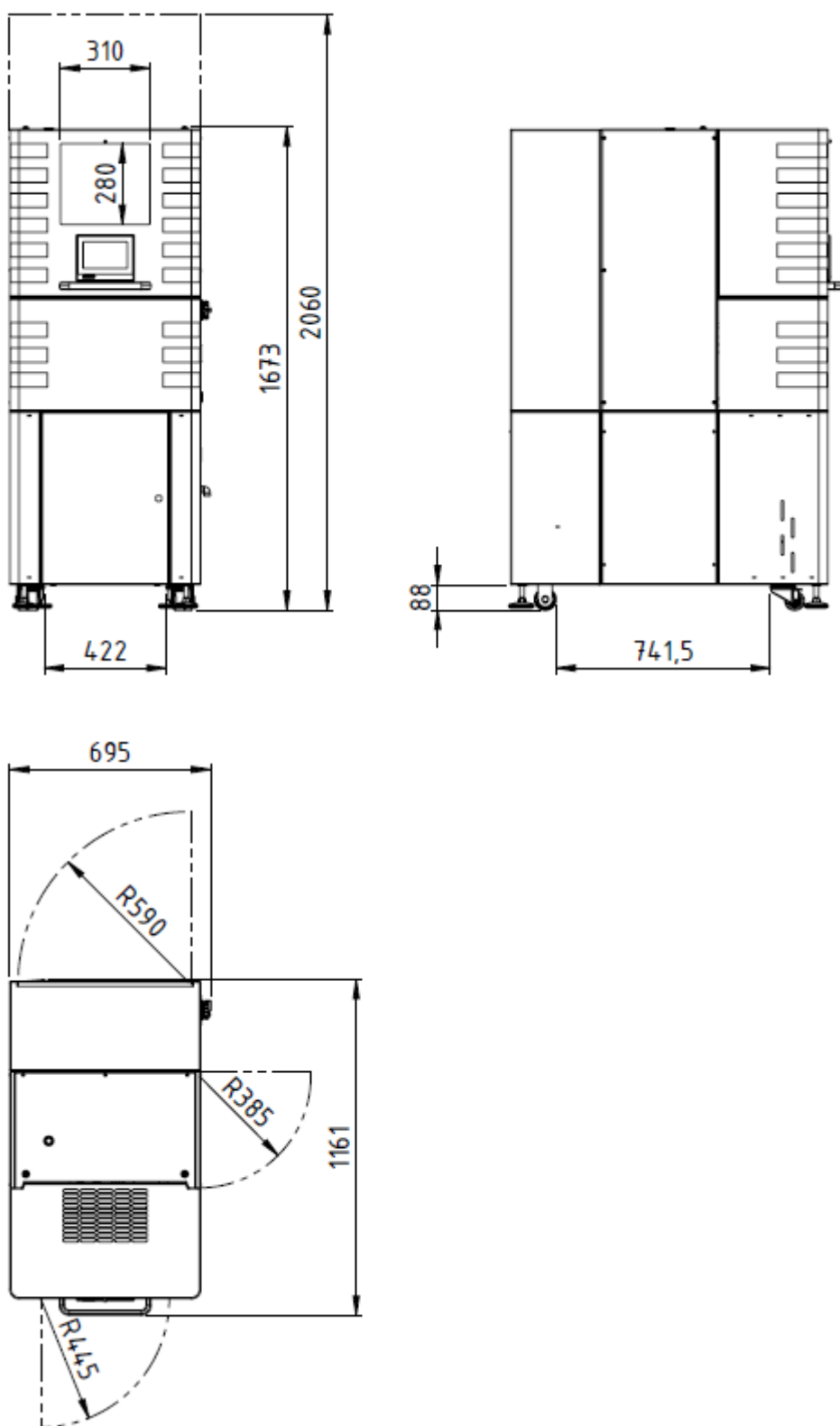
The machine must be placed on a suitable position and free of vibration. The load capacity of the floor should be at least 150 kg/m².

To ensure smooth operation of the milling machine, the unit must be positioned in an adequately ventilated room, whose internal temperature should not be above 25 ° C. Moreover, the machine should not be placed in proximity of heat sources. The openings at the top of the machine must not be covered.

The electrical connection of the machine must be done by a qualified electrician. According to the installation manual the electrician should connect the country-specific main voltage (200V - 240V) to the transformer.

A network cable (LAN RJ45) is available for the transmission of NC data. The connection is located in the electrical cabinet.

The connection must be performed by a qualified technician.



4.1 Floor space of the machine

Picture 8: Dimensions of the milling machine

Note: Make sure that the power supply and air cable cannot be damaged. The condition of the cables should be checked regularly by qualified personnel.

4.2 Connections

Please check the following points before you turn on the machine:

- Is the compressed air supply (6bar) connected to the machine →Picture 8
- Is the power cable connected to the power source →Picture 9
- Is the network cable connected (if necessary) →Picture 10



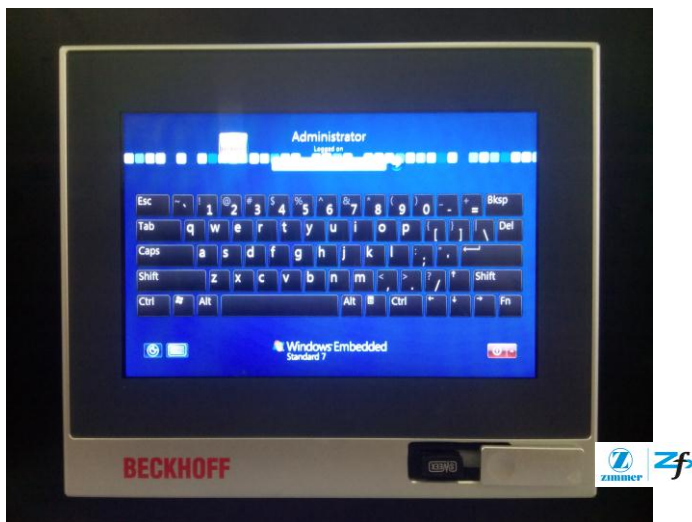
Picture 8. Compressed air connection



Picture 9. Power supply



Picture. 10 Network connection



Picture 11. Front-USB

Note:

When the power is off, the door to the working chamber is locked.

The door safety switch is released after the machine is turned on.

Once satisfied with the points listed above the machine can be turned on.

5. Operation

5.1 Operating elements

5.1.1 Main switch

The main switch is located on the right side of the machine. To put the machine into operation, the main switch must be turned to position "I-ON".



Picture 12. Main switch

5.1.2 EMERGENCY STOP

If you turn the main switch to position "0-OFF" the machine will stop immediatly.

>> The message "ID1 – Emergency Stop" will appear on the display

The door to the work chamber can only be opened after the absolute arrest of the spindle.



Picture 13. EMERGENCY STOP

5.1.3 Unlock „EMERGENCY STOP“

The Emergency Stop can be unlocked by turning the main switch to "I- ON" (see Picture 12).

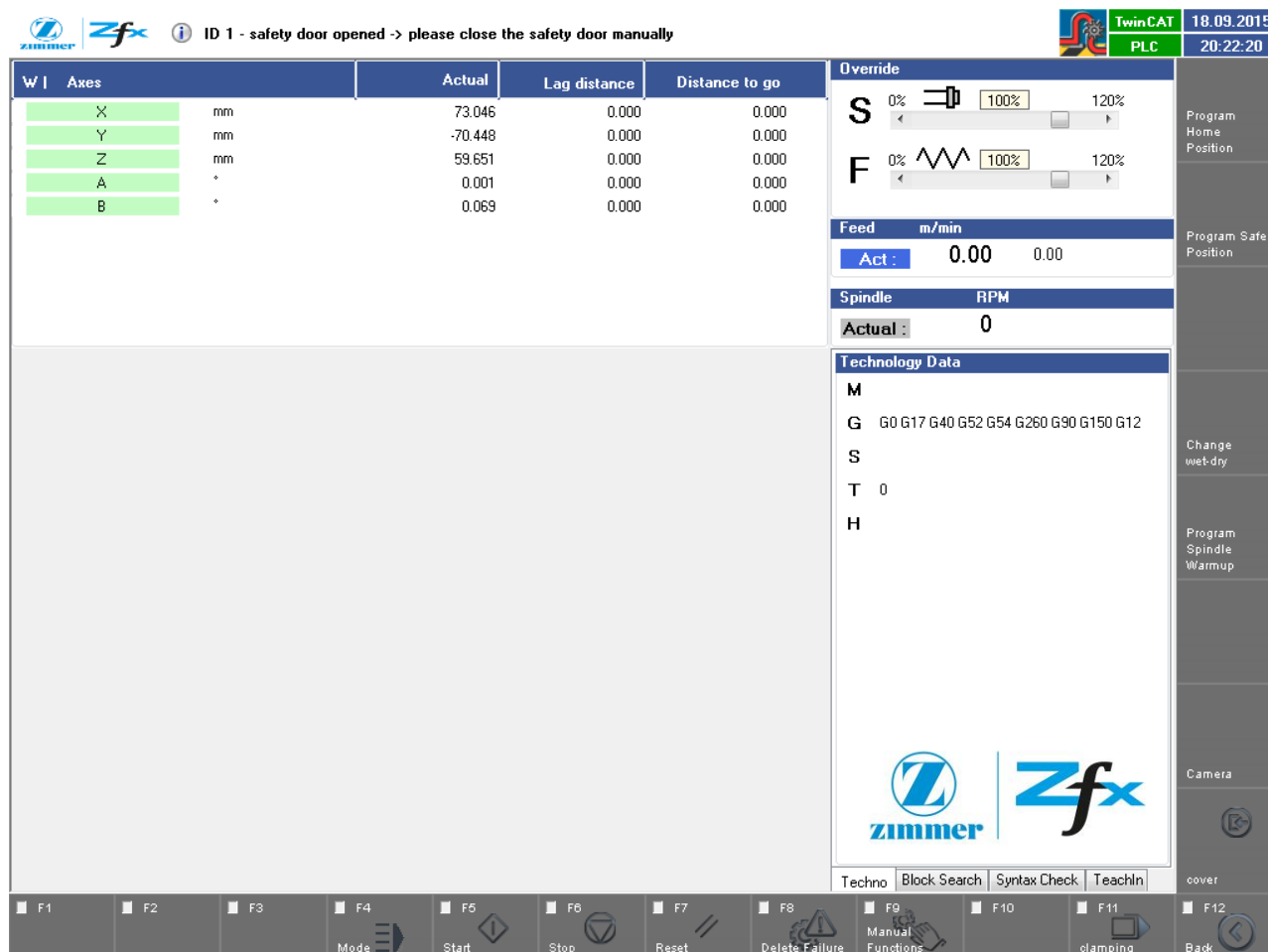
The machine can be operated by deleting the message on the touch screen.

5.2. User interface

5.2.1 Startup screen

The Zfx™ Inhouse5x has an embedded PC.

After starting the machine, the start-up window appears on the touch screen (Picture 14).



Picture 14. Startup window

The initial screen shows the commands for the main functions and menus, as well as the information box that can be selected with the touch screen.

Function commands:

F1	Free	F7	Reset
F2	Free	F8	Delete Failure
F3	Free	F9	Manual Functions
F4	Mode	F10	Free
F5	Start	F11	Clamping
F6	Stop	F12	Back

5.2.2 Referencing and startup

After closing the door, the machine moves automatically to the references.

- 1.) After all axes have moved from red to green, the referencing is finished (Picture 15).
- 2.) Press Button “Program Home Position”
- 3.) Press “Start” Button

The screenshot displays the 'ID 6 - axes referencing -> reference program running' screen. The interface includes a table for axis status, a right-hand panel with override and feed controls, and a bottom toolbar with function buttons.

W I	Axes	Actual	Lag distance	Distance to go
	X	0.000	0.000	0.000
	Y	33.996	-0.001	0.000
	Z	0.000	0.000	0.000
	A	0.000	0.000	0.000
	B	-0.001	0.001	0.000

Annotations in the image:

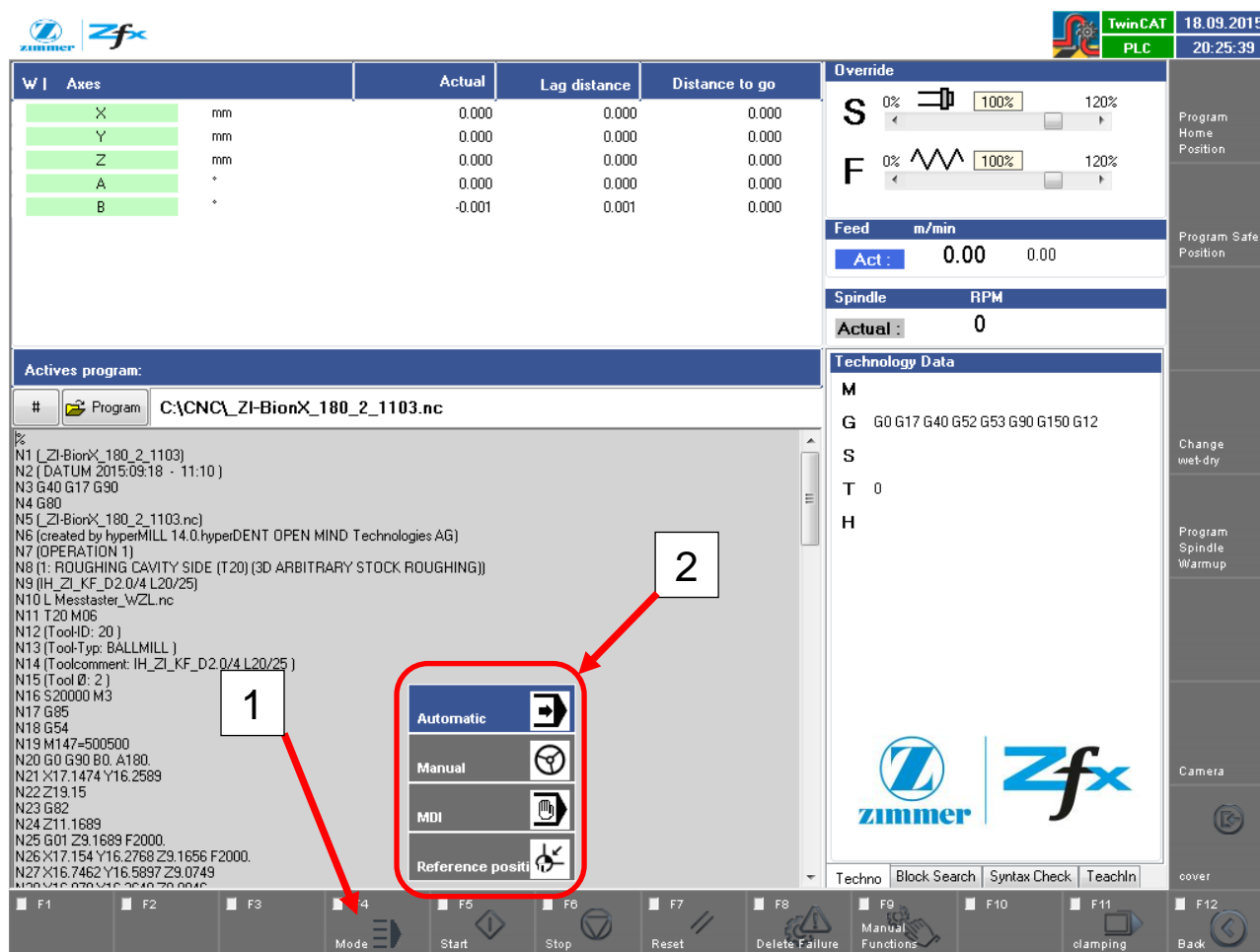
- 1:** Points to the 'Actual' column of the axes table.
- 2:** Points to the 'Program Home Position' button in the right-hand panel.
- 3:** Points to the 'Start' button (F5) in the bottom toolbar.

Picture 15. Axes reference

5.2.3 Operating Mode (F4 Mode)

The control of the milling machine can be done in different operating modes:

- Automatically (milling program)
- Manually
- Manual Data Input (MDI)
- Research References




Picture 16. F4 Mode > Operating Mode

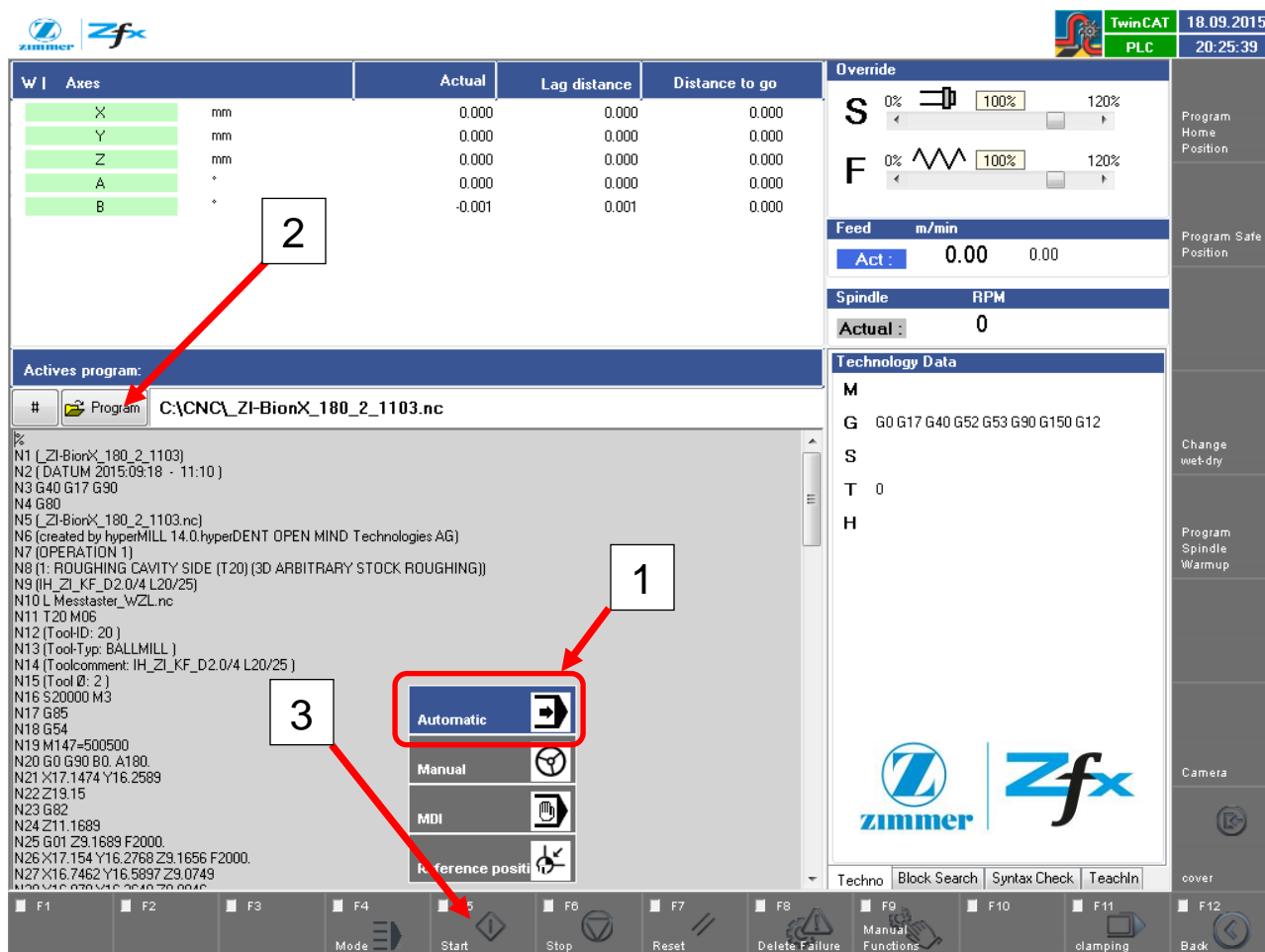
5.2.3.1 Mode > Automatic

A milling program is executed as follows (see Picture 17):

- Save a milling program in the folder "CNC".
- Main Menu> F4 (Automatic)
- Button - Program
- Select the required program by double-clicking
- Run the program via "Start"



The door must be closed!



W Axes	Actual	Lag distance	Distance to go
X mm	0.000	0.000	0.000
Y mm	0.000	0.000	0.000
Z mm	0.000	0.000	0.000
A °	0.000	0.000	0.000
B °	-0.001	0.001	0.000

Active program: C:\CNC\ZI-BionX_180_2_1103.nc


```

%
N1 [_ZI-BionX_180_2_1103]
N2 [DATUM 2015.09.18 - 11:10 ]
N3 G40 G17 G90
N4 G80
N5 [_ZI-BionX_180_2_1103.nc]
N6 (created by hyperMILL 14.0.hyperDENT OPEN MIND Technologies AG)
N7 (OPERATION 1)
N8 (1: ROUGHING CAVITY SIDE (T20) (3D ARBITRARY STOCK ROUGHING))
N9 (IH_ZI_KF_D2.0/4 L20/25)
N10 L Mesmaster_wZL.nc
N11 T20 M06
N12 [Tool-ID: 20 ]
N13 [Tool-Typ: BALLMILL ]
N14 [Toolcomment: IH_ZI_KF_D2.0/4 L20/25]
N15 [Tool Ø: 2 ]
N16 S20000 M3
N17 G85
N18 G54
N19 M147-500500
N20 G0 G90 B0. A180.
N21 X17.1474 Y16.2589
N22 Z19.15
N23 G82
N24 Z11.1689
N25 G01 Z9.1689 F2000.
N26 X17.154 Y16.2768 Z9.1656 F2000.
N27 X16.7462 Y16.5897 Z9.0749
N28 X16.070 Y16.2616 Z9.0749
  
```

Mode: Start (F5)

Picture 17. F4 Mode >Automatic Mode




Stop, restart and cancel a program execution

A running program is indicated by  the yellow button.

You can interrupt it by pressing the button.

The interruption of a program is indicated by the red button.

When you stop a running program, only the movements of the axes are stopped. The spindle drive and all other functions are not stopped. The door of the machining area remains locked.

By pressing the  button the interrupted program restarts  and  continues processing.

By pressing the button the program “execution” can be completely canceled.

To bring all axes in starting/home position use the quickstart program and press

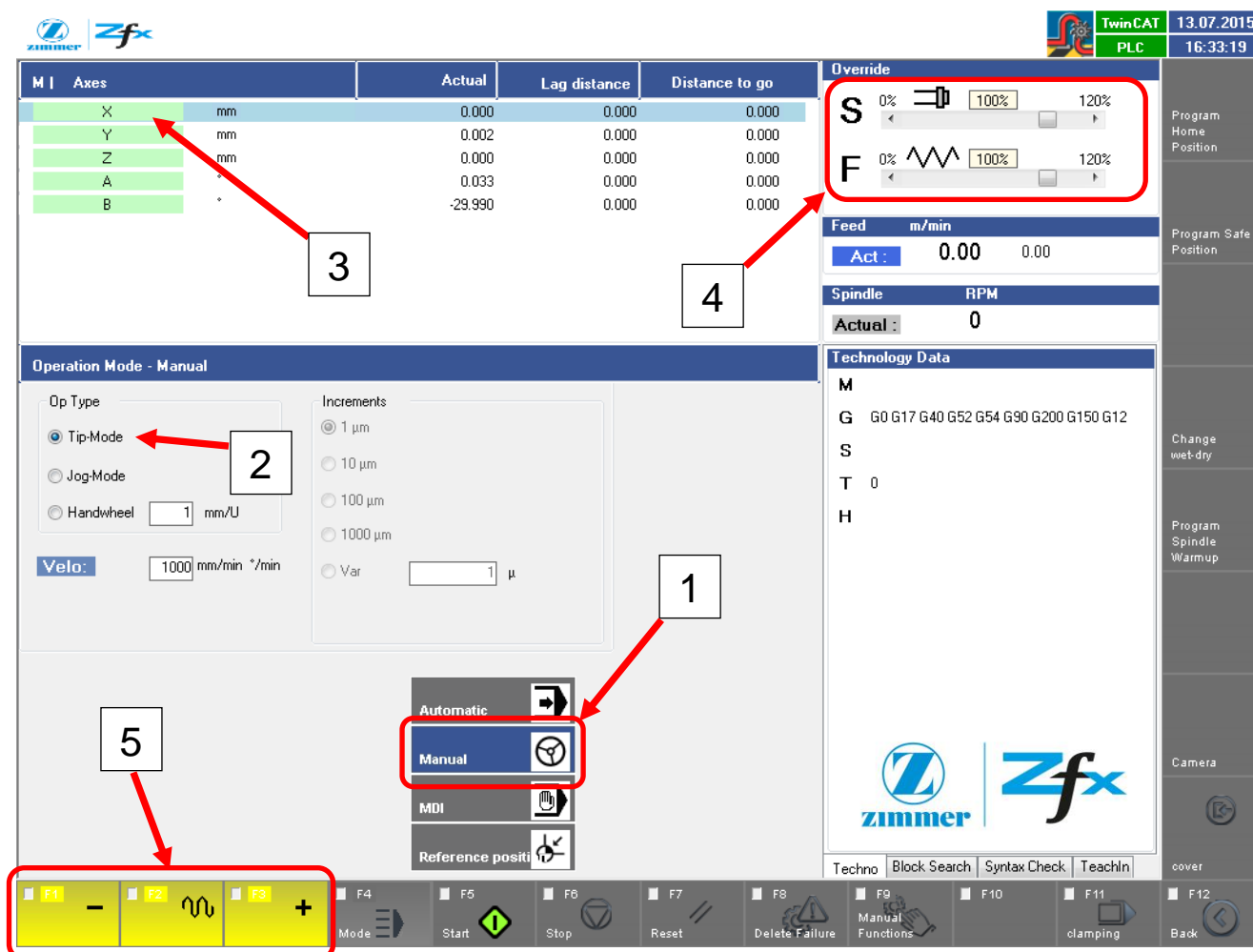
Note: Ongoing programs should first be stopped and then eventually reset. Avoid, if possible, the use of the Reset button to change the milling material, the milling tool or measurement of the milling tool.

Note: Make sure that there are sufficient milling tools in the magazine and they still have adequate life time. If a required milling tool is not in position, the milling process stops! The loading of the tool magazine with new tools for milling is described in Chapter 5.4.3.

5.2.3.2 Mode > Manual

The operating mode „Manual“ is selected through the main menu and subsequently with F4.

	The door must be closed!
--	---------------------------------



Picture 18. F4 Mode >Manual Mode


In the manual mode the following settings can be made (Picture 19):

2	HB Typ	Tip Mode	The axis can be moved in inching mode
2	HB Typ	Jog Mode	Set increments by clicking the required value or free input with „Var“.
3			Select the required axes
4	S	Spindle speed	Set by moving the bar
4	F	Boost, drive	Set by moving the bar
5	+/-		Move the axes in positive or negative direction

5.2.3.3 Mode > Manual Data Input (MDI)

In hand setting mode (MDI) the selected NC commands (Command G/ Command M) can be executed.

- Input of the desired NC command (e.g. G54)
- Run with Start button



The door must be closed!

M	Axis		Actual	Lag distance	Distance to go
	X	mm	0.000	0.000	0.000
	Y	mm	0.002	0.000	0.000
	Z	mm	0.000	0.000	0.000
	A	°	0.033	0.000	0.000
	B	°	-29.990	0.000	0.000

Override

S 0% 100% 120%

F 0% 100% 120%

Feed m/min

Act: 0.00 0.00

Spindle RPM

Actual: 0

Technology Data

M

G G0 G17 G40 G52 G54 G90 G200 G150 G12

S

T 0

H

Operation Mode - Manual Set

G54 X0 Y0

Automatic

Manual

MDI

Reference position

F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12

Mode Start Stop Reset Delete Failure Manual Functions clamping Back

Picture 19. F4 Mode > Mode MDI

5.2.4 Overview of commands

5.2.4.1. G-Commands

Additional commands	Meaning	Note	modal	global
G0 / G00	Movement with fast speed			
G1 / G01	Linear interpolation with Cartesian kinematics S-PTP movement without Cartesian kinematic	Define feed rate F		
G2 / G02	Circular interpolation clw with Cartesian kinematic	With I/J/K to define the center point		
G3 / G03	Circular interpolation cclw with Cartesian kinematic	With I/J/K to define the center point		
G4	Permanence time	in m sec or R-Variable		
G17	Select X-Y plane			
G18	Select X-Z plane			
G19	Select Y-Z plane			
G40	Tool cutter compensation off (radius comp.)			
G41	Tool cutter compensation left (radius comp.)			
G42	Tool cutter compensation right (radius comp.)			
G43	Apply tool length compensation (plus)			
G44	Apply tool length compensation (minus)			
G49	Tool length compensation cancel			
G80	Base position			
G81	HSC Filter off			
G82	HSC Roughing filter			
G83	HSC Finishing filter			
G84	HSC Precise			
G85	Safe position			
G90	The coordinates are (Absolut Value)			
G91	The coordinates are relating information (Incremental)			

5.2.4.2. M-Commands

Additional commands	Meaning	modal	global
M00	Interrupting the planned program (Abort) requires operator intervention		
M01	Interrupting the planned program (Stop) requires operator intervention		
M02	Program termination >In contrast to the M30 a working Spindle will not be stopped		
M03	Start the spindle (Clockwise rotation)		
M04	Start the spindle (Counterclockwise rotation)		
M05	Turn off the spindle		
M06	Manual tool-change		
M08 / M09	Pump On / Off		
M10	Loosen clamping system		
M11	Free		
M30	End of Program, Rewind and Reset Modes		
M44 / M45	Clamping system open / close		
M143	Tighten clamping system		
M144	Clean camera (e.g. M144=10000)		
M145	Open Tool Magazine hood		
M146	Close Tool Magazine hood		
M147 / M148	Air-cooling On / Off		
M149 / M150	Exhaust slide open / close		

5.3. Machine Parameters

	Changes in the machine parameters can lead to malfunction!
--	---

5.3.1 Machine Parameters - Position

13.07.2015

16:22:39

Machine Data

- Position
- Settings

No.	Description	Value	Unit
1	Offset Achse X (sichere Position)	-1	mm
2	Offset Achse Y (sichere Position)	30	mm
3	Offset Achse Z (sichere Position)	0	mm
4	Offset Achse A (sichere Position)	-92.004	°(-92.072)
5	Offset Achse B (sichere Position)	138.042	°138.024
6	NPV G54 Achse X	-74.464	mm(-74.441)...
7	NPV G54 Achse Y	70.068	mm(70.075)
8	NPV G54 Achse Z	-87.238	mm(-87.244)
9	NPV G54 Achse A	0	°(-0.086)
10	NPV G54 Achse B	0.009	°(-0.007)
11	WZ Tasterposition in X	-7.288	mm(-5.66)
12	WZ Tasterposition in Y	151.596	mm
13	WZ Tasterposition in Z	-49.485	mm
14	WZ Tasterposition in B	64.917	°
15	Werkzeugwechslerplatz 0 X-Position	34.062	mm(34.03)
16	Werkzeugwechslerplatz 0 Y-Position	154.73	mm(154.67)
17	Werkzeugwechslerplatz 0 Z-Position, Vorposition...	-40.39	mm (delta 5...
18	Werkzeugwechslerplatz 0 Z-Position, Werkzeuga...	-62.39	mm (delta 1...
19	Werkzeugwechslerplatz 0 Z-Position, Werkzeuga...	-76.39	mm-78.7 (1...
20	Werkzeugwechslerplatz 0 B-Position	-28.62	°(-28.465)
21	Softwareendlage X positiv	39	mm
22	Softwareendlage X negativ	-155	mm
23	Softwareendlage Y positiv	157	mm
24	Softwareendlage Y negativ	0	mm
25	Softwareendlage Z positiv	1.8	mm
26	Softwareendlage Z negativ	-90	mm
27	Softwareendlage A positiv	1500	°
28	Softwareendlage A negativ	-1500	°
29	Softwareendlage B positiv	120	°
30	Softwareendlage B negativ	-35	°
31	B-Offset WW-Leiste 0	0	°
32	B-Offset WW-Leiste 1	-0.019	°
33	B-Offset WW-Leiste 2	-0.041	°
34	B-Offset WW-Leiste 3	-0.25	°(-0.12)
35	AB Versatz positiv, a in Z- bei B0 (nur Info)	0.039	mm(0.071)
36		0	

F1F2F3F4F5F6F7F8F9F10F11F12

PLC Status
Machine Parameters
Save
Back

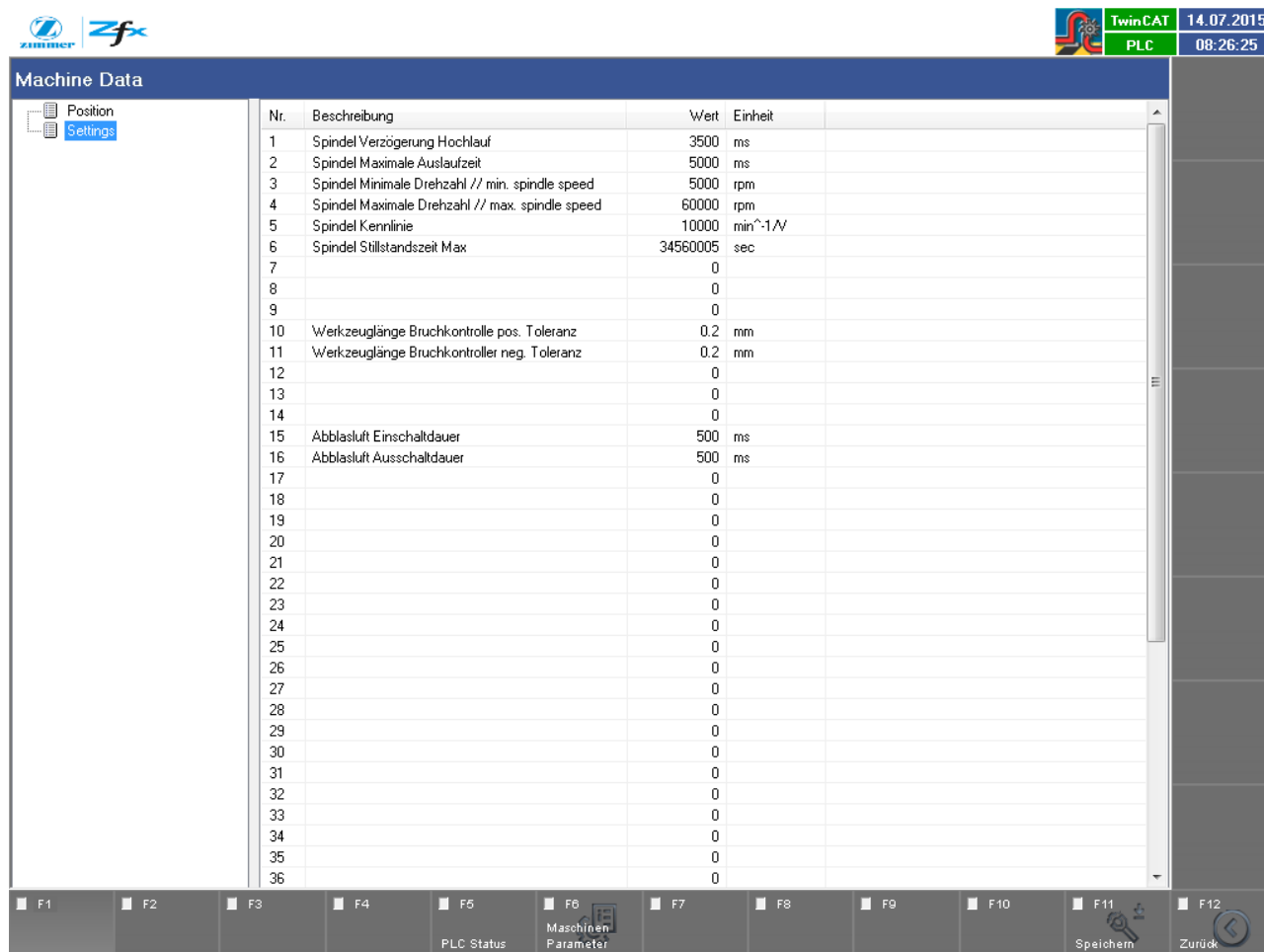
Picture 20. Machine Parameters - Position

Machine Parameters - Position:

Nr.	Description	Meaning
1	Offset Achse X (sichere Position)	Machine zero point X-axis MCS
2	Offset Achse Y (sichere Position)	Machine zero point Y-axis MCS
3	Offset Achse Z (sichere Position)	Machine zero point Z-axis MCS
4	Offset Achse A (sichere Position)	Machine zero point A-axis MCS
5	Offset Achse B (sichere Position)	Machine zero point B-axis MCS
6	NPV G54 Achse X	Workpiece zero point X-axis WCS
7	NPV G54 Achse Y	Workpiece zero point Y-axis WCS
8	NPV G54 Achse Z	Workpiece zero point Z-axis WCS
9	NPV G54 Achse A	Workpiece zero point A-axis WCS
10	NPV G54 Achse B	Workpiece zero point B-axis WCS
11	WZ Tasterposition in X	X-Position of the toolmeasuring sensor in MCS
12	WZ Tasterposition in Y	Y-Position of the toolmeasuring sensor in MCS
13	WZ Tasterposition in Z	Z-Position of the toolmeasuring sensor in MCS
14	WZ Tasterposition in B	B-Position of the toolmeasuring sensor in MCS
15	Werkzeugwechslerplatz 0 X-Position	Toolposition 0 X-axis in MCS
16	Werkzeugwechslerplatz 0 Y-Position	Toolposition 0 Y-axis in MCS
17	Werkzeugwechslerplatz 0 Z-Position, Vorposition, Rückzugposition	Toolposition 0 Z-axis (prepositioning) in MCS
18	Werkzeugwechslerplatz 0 Z-Position, Werkzeugablage	Toolposition 0 Z-axis (pick up tool) in MCS
19	Werkzeugwechslerplatz 0 Z-Position, Werkzeugaufnahme	Toolposition 0 Z-axis (store tool) in MCS
20	Werkzeugwechslerplatz 0 B-Position	Toolposition 0 B-axis in MCS
21	Softwareendlage X positiv	limit stop – X axis positive
22	Softwareendlage X negativ	limit stop – X axis negative
23	Softwareendlage Y positiv	limit stop – Y axis positive
24	Softwareendlage Y negativ	limit stop – Y axis negative
25	Softwareendlage Z positiv	limit stop – Z axis positive
26	Softwareendlage Z negativ	limit stop – Z axis negative
27	Softwareendlage A positiv	limit stop – A axis positive
28	Softwareendlage A negativ	limit stop – A axis negative
29	Softwareendlage B positiv	limit stop – B axis positive
30	Softwareendlage B negativ	limit stop – B axis negative

5.3.2 Machine Parameters - Settings

Default tolerance values for the break control of the milling tool, on and off periods of the compressed air and other parameters of the machine can be set here.



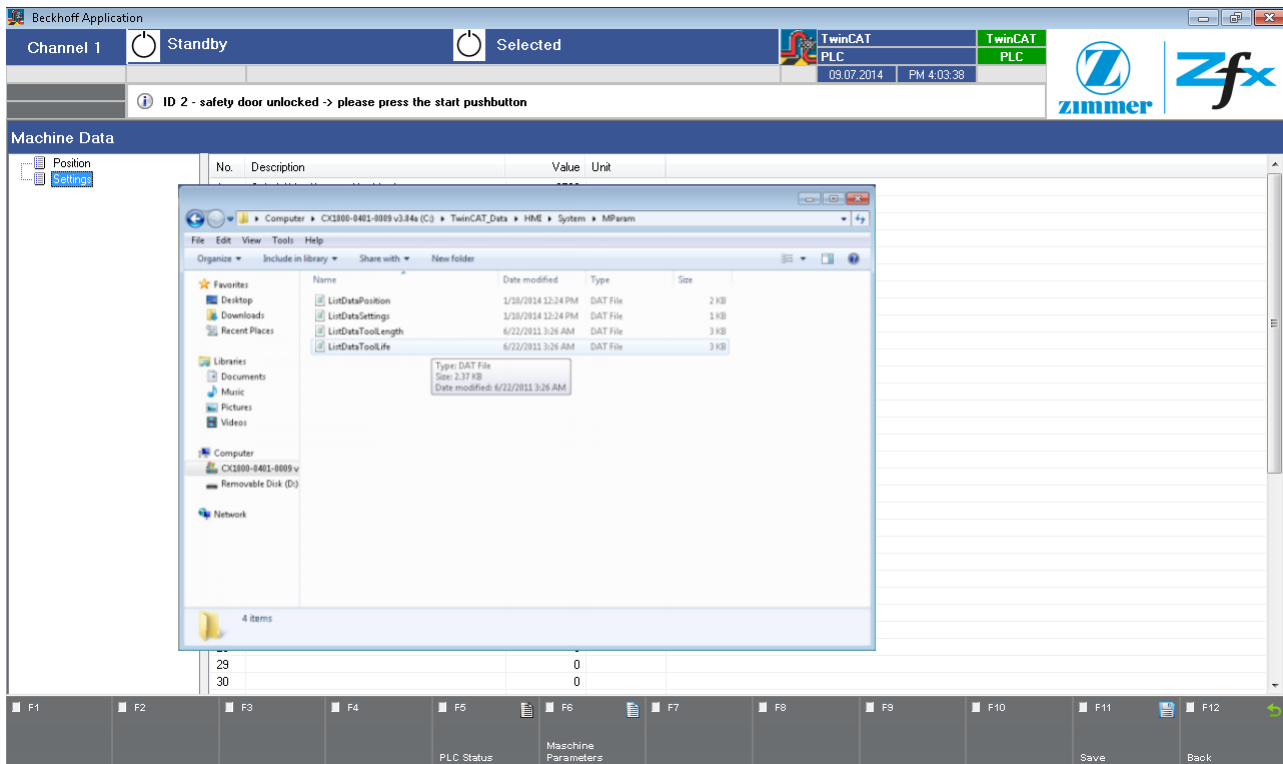
Picture 21. Machine Parameters – Settings

Nr.	Description	Meaning
10	Werkzeuglänge Bruchkontrolle pos. Toleranz	Tool-breakage control pos. tolerance
11	Werkzeuglänge Bruchkontrolle neg. Toleranz	Tool-breakage control neg. tolerance
15	Abblasluft Einschaltdauer	Air-cooling turn-on duration
16	Abblasluft Ausschaltdauer	Air-cooling turn-off duration

5.3.3 Machine Parameters – Path

The machine parameters are stored in the following folder:

C:\TwinCAT_Data\HMI\System\MParam



Picture 22. Machine Parameters – path

5.4 Automatic tool changer

5.4.1 In general



Picture 23. Tool magazine with tools

The tool magazine consists of a cylinder in which are positioned 27 tools and 1 setting pin. The individual tools are marked with numbers 0-27. These correspond to the numbers of the tool magazine positions in the user interface.

The setting pin is placed in the "0" position. The pin is inserted in the spindle during recharging operations of the magazine. In this occasion, you can also change the milling tool that was previously inserted into the chuck.

The probe for the automatic measurement of the length of the milling tool is located on the right side of the automatic clamping system. Before the milling process begins, the length of the milling tool is measured and stored as a reference length in the system. At the end of a milling operation, the length of the milling tool is measured again. The system gives a warning message if during the verification process a deviation from the previously measured reference length is detected.

See Chapter 5.4.4

Description tool change:

- The magazine is turned simultaneously with the B-axis
- After changing, all the milling tools are measured in length.
- If the milling tool is already in the spindle, only the length is measured.
- Breakage Control with M commands (eg. define tolerances μm 30).
- Sister tool management: Each instrument has a designated working life. If this expires, the milling tool.

5.4.2 F8 Tool definition - detect the characteristics of the milling tool type

To add new types of milling tools the following information/data must be entered in the table (Picture 24: Tool Definition):

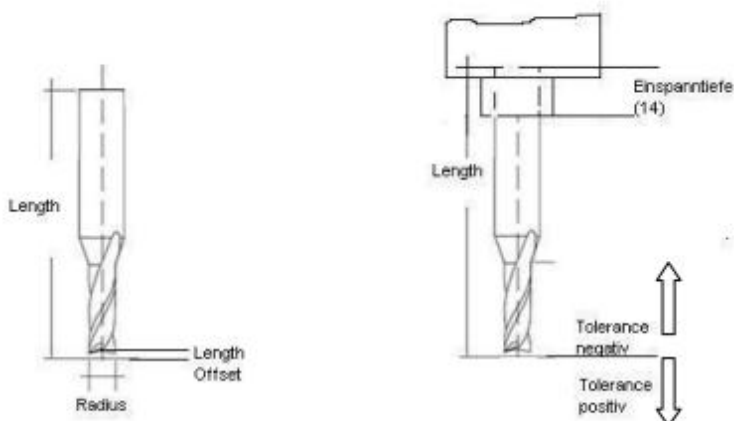
Tool Description	ID	Length [mm]	Length Offset [mm]	Tolerance Pos [mm]	Tolerance Neg [mm]	Radius [mm]	Radius Offset [mm]	Time Max [min]	Distance Max [mm]	Valid
	0	40	0	3	3	0	2	999999	0	<input checked="" type="checkbox"/>
ZI_KF_D0,5	5	42	0	3	3	0	0.3	24000	0	<input checked="" type="checkbox"/>
ZI_KF_D1	10	42	0	3	3	0	0.5	120000	0	<input checked="" type="checkbox"/>
ZI_KF_D1,5	15	42	0	3	3	0	0.75	120000	0	<input checked="" type="checkbox"/>
ZI_KF_D2	20	45	0	3	3	0	1	120000	0	<input checked="" type="checkbox"/>
-	0	0	0	0	0	0	0	0	0	<input type="checkbox"/>
-	0	0	0	0	0	0	0	0	0	<input type="checkbox"/>
PMMA_KF_D0,6	6	42	0	3	3	0	0.3	24000	0	<input checked="" type="checkbox"/>
PMMA_KF_D1	11	42	0	3	3	0	0.5	24000	0	<input checked="" type="checkbox"/>
PMMA_KF_D1,5	16	42	0	3	3	0	0.75	24000	0	<input checked="" type="checkbox"/>
PMMA_KF_D2	21	42	0	3	3	0	1	24000	0	<input checked="" type="checkbox"/>
PMMA_SF_D4	162	45	0	3	3	0	2	24000	0	<input checked="" type="checkbox"/>
-	0	0	0	0	0	0	0	0	0	<input type="checkbox"/>
CC_KF_D1	100	40	0	3	3	0	0.5	24000	0	<input checked="" type="checkbox"/>
CC_KF_D1,5	111	40	0	3	3	0	0.75	24000	0	<input checked="" type="checkbox"/>
AB_RF_D2	153	40	0	3	3	0	1	24000	0	<input checked="" type="checkbox"/>
CC_KF_D0,5	189	40	0	3	3	0	0.25	24000	0	<input checked="" type="checkbox"/>
CC_KF_D1	201	40	0	3	3	0	0.5	24000	0	<input checked="" type="checkbox"/>
CC_KF_D1,5	214	40	0	3	3	0	0.75	24000	0	<input checked="" type="checkbox"/>
CC_KF_D2	221	40	0	3	3	0	2	48000	0	<input checked="" type="checkbox"/>
-	0	0	0	0	0	0	0	0	0	<input type="checkbox"/>
-	0	0	0	0	0	0	0	0	0	<input type="checkbox"/>
-	0	0	0	0	0	0	0	0	0	<input type="checkbox"/>
-	0	0	0	0	0	0	0	0	0	<input type="checkbox"/>
-	0	0	0	0	0	0	0	0	0	<input type="checkbox"/>
GCER_KF_D0,5	121	40	0	3	3	0	0.3	24000	0	<input checked="" type="checkbox"/>
GCER_KF_D1	122	40	0	3	3	0	0.5	24000	0	<input checked="" type="checkbox"/>
GCER_KF_D2	123	40	0	3	3	0	1	24000	0	<input checked="" type="checkbox"/>
-	0	0	0	0	0	0	0	0	0	<input type="checkbox"/>

Control Panel: F1 Clear Tool, F2, F3, F4, F5, F6, F7, F8, F9 Import, F10 Export, F11 Save, F12 Back

Picture 24. F8 > Tool definition

	<p>A milling tool outside the tolerance may stop the NC-program.</p> <ul style="list-style-type: none"> ➤ The unit stops and the instrument is blocked!
--	--

Description tool	Description / tool name (free text)	Annotation
ID	Nr° tool	
Length (mm)	Milling tool length in mm	
Offset length (mm)	Modify tool length in mm	As needed, e.g. to extend: +5 mm or shorter, eg: -4 mm
Tolerance Positive (mm)	Tolerance clamping depth in mm	An error message appears if the tool is outside the fixed tolerance!
Tolerance Negative (mm)	Tolerance clamping depth in mm	An error message appears if the tool is outside the fixed tolerance!
Radius (mm)	Radius in mm	
Offset radius (mm)	change radius	Tolerance lower / higher An error message appears if the tool diameter \varnothing is outside the fixed tolerance!
Time max (min)	Work time in minutes/ 0 = any monitoring	
Distance max (mm)		Not used!
Valid		<i>A check mark must be set to use the tool!</i>



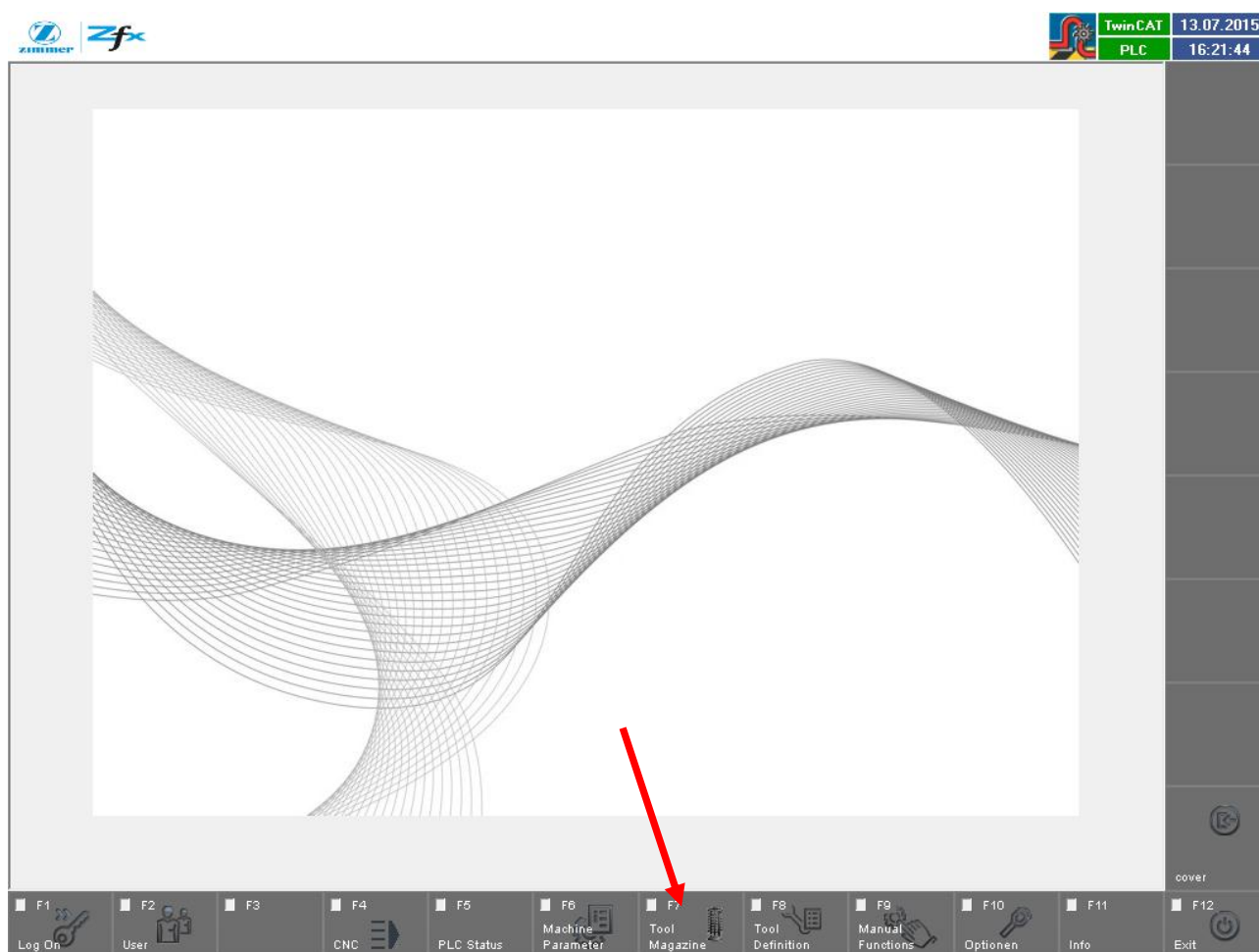
5.4.3 F7 Tool Magazine – Tool aquisition

Inserting a new milling tool:


It is possible to define 28 different milling tools. Each milling tool place must be defined and managed by entering the data in the tool menu F7 and saved through "set".

	<p><i>The door must be closed!</i></p>
--	---


- Main Menu > F7 Tool Magazine (Picture 25)

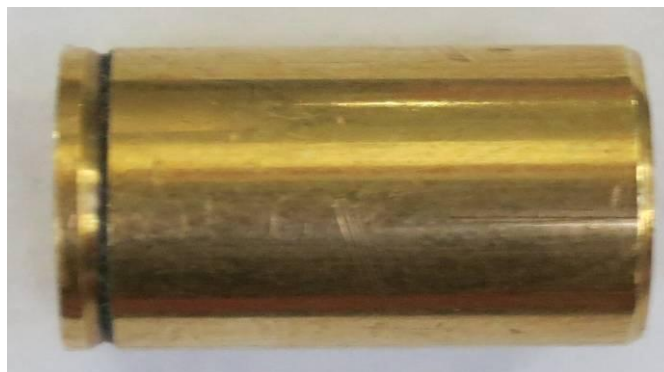


Picture 25. Main menu > F7 Tool Magazine

- Choose tool change position 1, 2, 3 or 4 and  press .



- Open the door with the button 
- Place the milling tool in one of the positions from 0 to 27. The milling tool must be aligned (Pictures 26 and 27).
To insert the milling tool into the selected position, use the set-up tool. Afterwards remove the set-up tool.



Picture 26: Set-up tool



Picture 27. Push out the instrument

- Enter milling tools and save through



6 <input type="text" value="20"/> <input type="button" value="set"/> 0 ZI_KF_D2	13 <input type="text" value="123"/> <input type="button" value="set"/> 374 GCER_KF_D2	20 <input type="text" value="221"/> <input type="button" value="set"/> 0 CC_KF_D2	27 <input type="text" value="100"/> <input type="button" value="set"/> 383 CC_KF_D1
5 <input type="text" value="15"/> <input type="button" value="set"/> 0 ZI_KF_D1,5	12 <input type="text" value="122"/> <input type="button" value="set"/> 377 GCER_KF_D1	19 <input type="text" value="214"/> <input type="button" value="set"/> 0 CC_KF_D1,5	26 <input type="text" value="111"/> <input type="button" value="set"/> 391 CC_KF_D1,5
4 <input type="text" value="20"/> <input type="button" value="set"/> 1495 ZI_KF_D2	11 <input type="text" value="121"/> <input type="button" value="set"/> 395 GCER_KF_D0,5	18 <input type="text" value="123"/> <input type="button" value="set"/> 315 GCER_KF_D2	25 <input type="text" value="189"/> <input type="button" value="set"/> 392 CC_KF_D0,5
3 <input type="text" value="15"/> <input type="button" value="set"/> 576 ZI_KF_D1,5	10 <input type="text" value="100"/> <input type="button" value="set"/> 0 CC_KF_D1	17 <input type="text" value="122"/> <input type="button" value="set"/> 326 GCER_KF_D1	24 <input type="text" value="153"/> <input type="button" value="set"/> 397 AB_RF_D2
2 <input type="text" value="10"/> <input type="button" value="set"/> 773 ZI_KF_D1	9 <input type="text" value="111"/> <input type="button" value="set"/> 0 CC_KF_D1,5	16 <input type="text" value="121"/> <input type="button" value="set"/> 388 GCER_KF_D0,5	23 <input type="text" value="201"/> <input type="button" value="set"/> 390 CC_KF_D1
1 <input type="text" value="5"/> <input type="button" value="set"/> 218 ZI_KF_D0,5	8 <input type="text" value="189"/> <input type="button" value="set"/> 0 CC_KF_D0,5	15 <input type="text" value="10"/> <input type="button" value="set"/> 0 ZI_KF_D1	22 <input type="text" value="214"/> <input type="button" value="set"/> 386 CC_KF_D1,5
0 <input type="text" value="0"/> <input type="button" value="set"/> 16667	7 <input type="text" value="153"/> <input type="button" value="set"/> 0 AB_RF_D2	14 <input type="text" value="5"/> <input type="button" value="set"/> 0 ZI_KF_D0,5	21 <input type="text" value="221"/> <input type="button" value="set"/> 695 CC_KF_D2

(Picture 28. tool magazine)

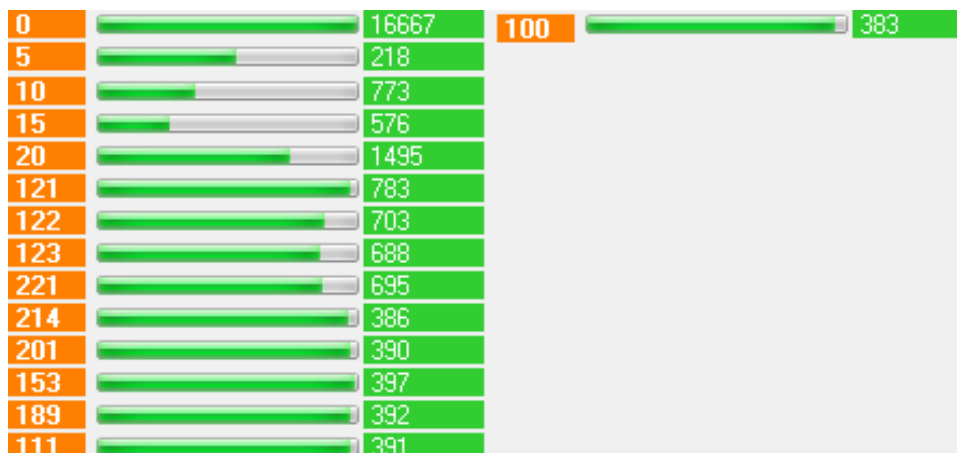
	Working > Milling tool place is equipped	<input type="button" value="set"/>	Reset Lifetime
	Blocked > Milling tool place is empty	ZI_KF_D1	Tool name
	Current lifetime		

Annotation:



By double-clicking on the padlock and saving through the  appropriate milling tool will be unlocked and therefore ready for operation .

- The Lifetime of all tools is shown by clicking the button



Picture 29. Assembling milling tool magazine – Tool status

- No work time monitoring
- With work time monitoring (e.g. 100 = Sum of the working time of instrument)

5.4.4 Tool breakage

If tool breakage occurs during the milling process, the milling program will be interrupted. The broken tool will be locked in the menu "Tool Magazine" and the life time of the tool will be set to 0.

- > **The milling process will stop.**
- > **The broken milling tool is locked.**

The broken milling tool must be replaced and unlocked as described below in the menu "5.4.3 F7 Tool Magazine – Tools acquisition".

Unlock tool:

By double-clicking on the padlock and saving through the button, the milling tool is unlocked and then valid .

After opening the door, remove any remnants of the broken milling tool from the collet chuck.

To do so, unscrew the Collet chuck 5° D4 for Zfx Inhouse5x from the spindle, as described in the extra instruction

Note: Be aware that the broken milling tool can be a source of injury!

After the Collet chuck 5° D4 for Zfx Inhouse5x has been unscrewed from the spindle, make sure that there are no more remnants of the milling tool in the collet. In this case, push a thin object, such as a milling tool through the clamp. Then clean the clamp from the outside with a cloth, and if necessary, blow out the inside with compressed air.

After cleaning the Collet chuck 5° D4 for Zfx Inhouse5x, ensure it is still intact. The clamping elements of the collet could be damaged by milling tool breakage.

In this case, the Collet chuck 5° D4 for Zfx Inhouse5x must be replaced.

5.5 F9 Manual functions

To perform manual functions click on the listed buttons (Picture 30):

Function	Current State	Target State
Spindle	Off	On
Pump	Off	On
Collet	Close	Open
clean camera	Off	On
Clamping system	Close	Open
Tighten clamping system	Off	On
Exhaust Slide	Close	Open
Tool magazine hood	Close	Open
Air-cooling	Off	On

Function Key Bar: F1, F2, F3, F4, F5 (Settings), F6, F7, F8, F9 (cover), F10 (Save), F11 (Mode), F12 (Back)

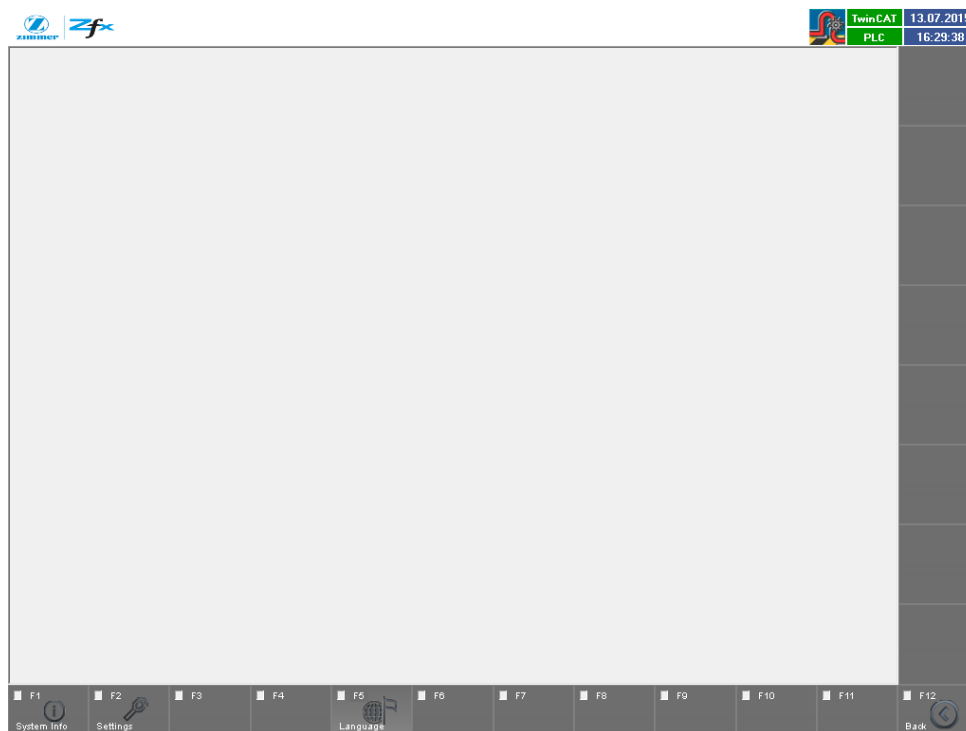
System Information: TwinCAT PLC, 13.07.2015, 16:20:27

Picture 30. Manual functions

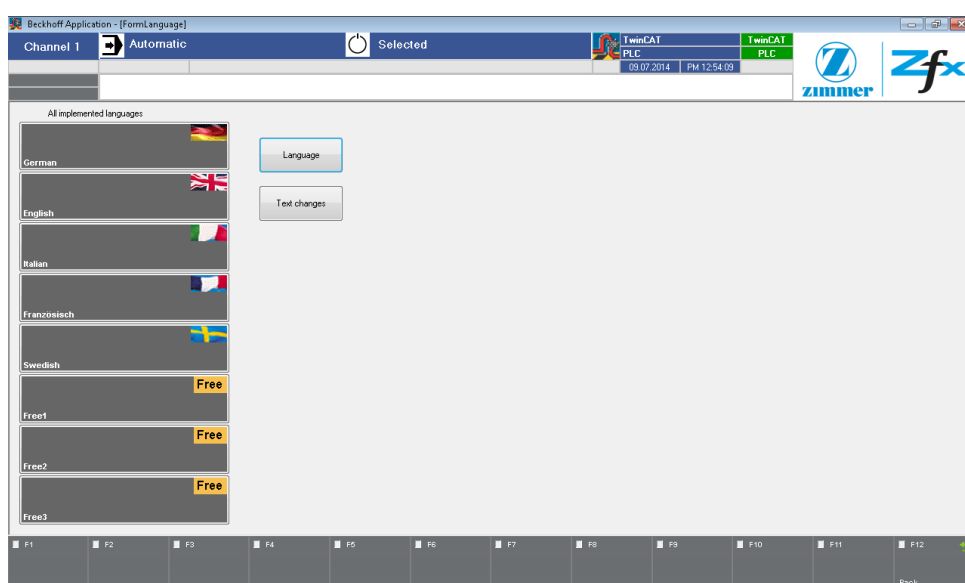
5.6 Country and language settings

To set the language, proceed as follows:

- Main menu > F10 Options
- F5 Language
- Select the requested language



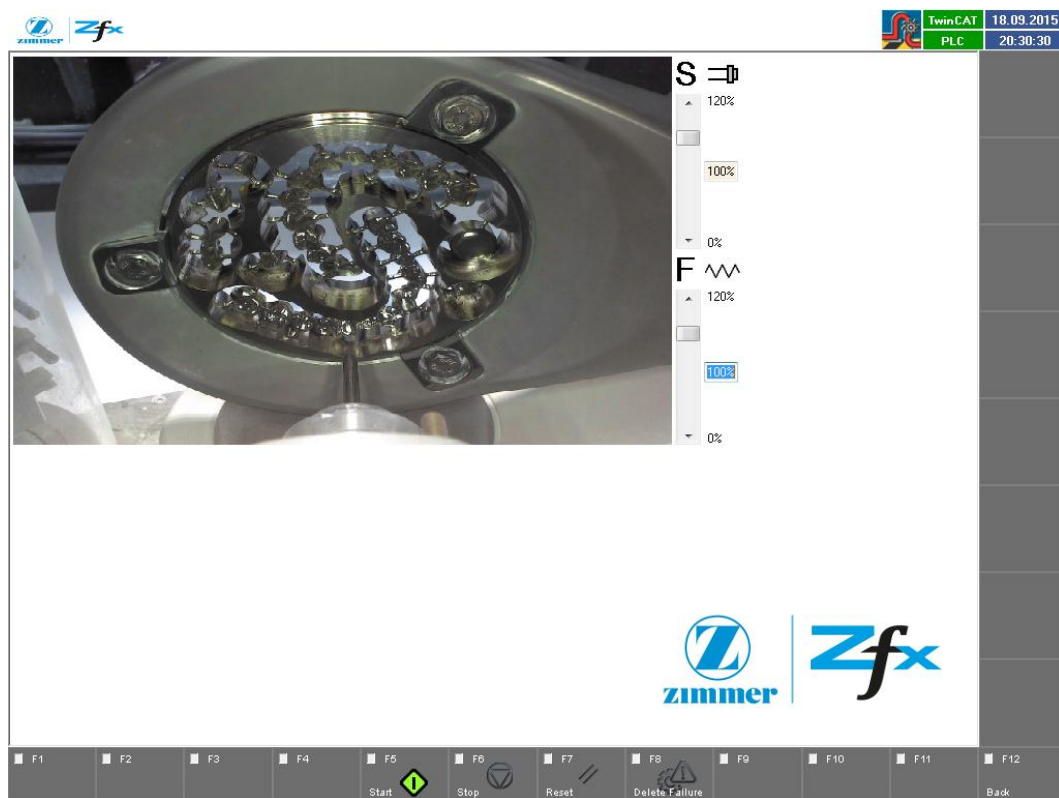
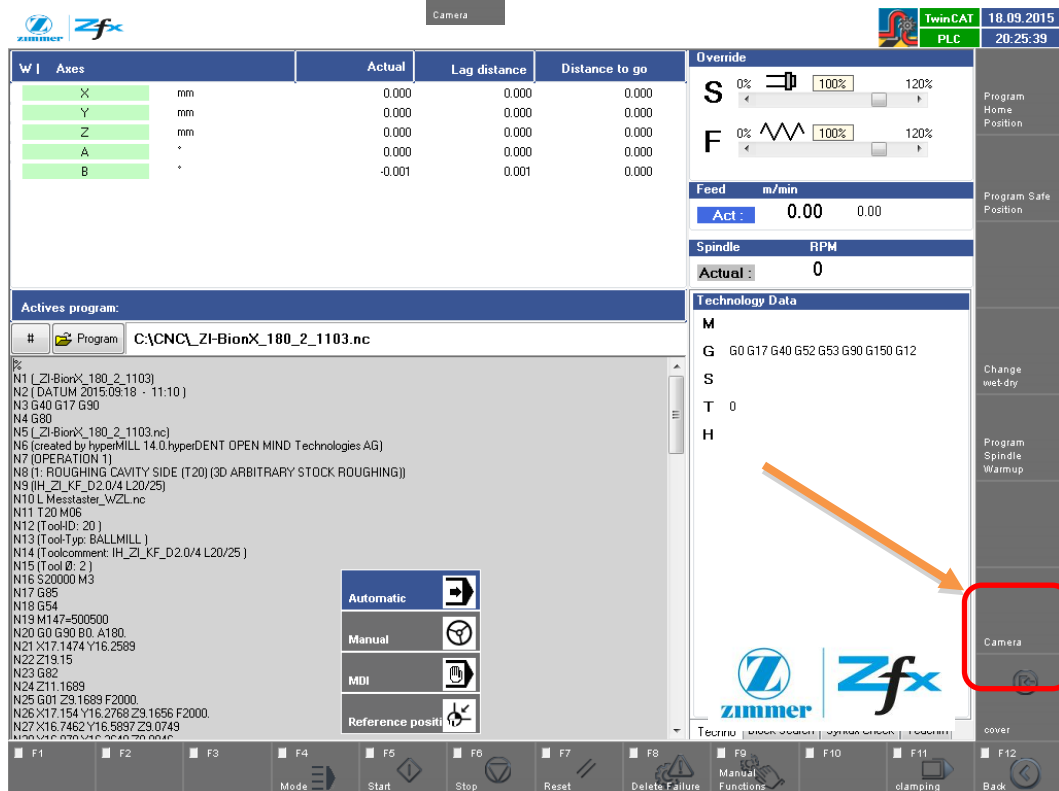
Picture 31. Language menu




Picture 32. Select language

5.7 Camera

To activate the integrated camera push the  button.



With the buttons  you can operate the machine while the camera is active.

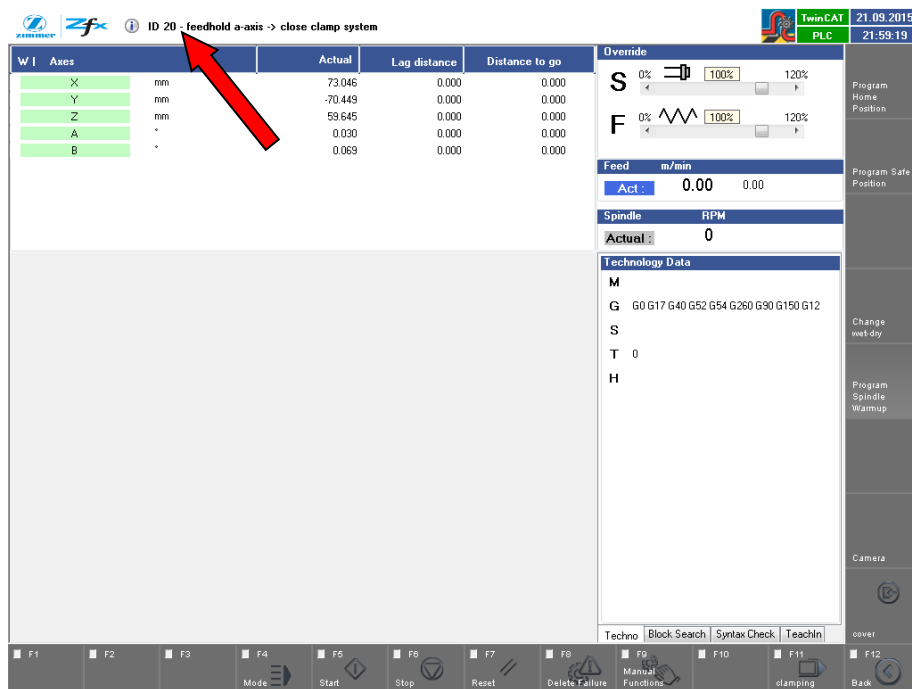
With the button  you will return to the Main menu.

6. Problem and error messages

Note: Most of the error messages already contain references to the corrective measures.

Some messages, such as "Sliding door open!" automatically disappear after eliminating the root cause.

Other errors need to be deleted, after eliminating the cause, by selecting the button "delete error message".



Picture 33. Viewing error information

Note: If the root cause of the problems and error messages are not removed, the message will continue to appear.

For more details double click the error or the message and click the button



ID 1 - safety door opened -> please close the safety door manually

 21.09.2015 22:00:54

FormMessages.labelEventLogStatus.ActiveEvents localize

Date	Time	Confirm	Reset	Confir...	ID	Class	State	Priority	Source Id	Source Name	Message
21.09.2015	19:48:53	0			1	5	1	0	30	Multimill - INSTRUCTION	ID 1 - safety door op
21.09.2015	20:19:44	0			20	5	1	0	30	Multimill - INSTRUCTION	ID 20 - feedhold e-as

Detailed Messages

Nr.	Description	Value

F1 View Active
F2 View Logged
F3 Details On / off
F4
F5 Clear Active
F6
F7
F8 Delete Failure
F9
F10
F11
F12 Back

6.1 Zfx™ Inhouse5x Errors


ID 1 - Emergency Stop
ID 2 - safety circuit opened
ID 3 - safety door not closed -> operator has to close the safety door manually
ID 4 - safety door not locked
ID 5 - interlock safety door couldn't get closed
ID 6 - emergency stop button still pressed
ID 7 - safety circuit has to get acknowledged by hardware pushbutton
ID 8 - safety circuit acknowledge timeout
ID 9 - timeout reset cnc-error
ID 10 - timeout release axes
ID 11 - minimum of one functionblock in TwinSAFE has an error
ID 12 - minimum of one TwinSAFE connection has an error
ID 13 - minimum of one TwinSAFE outputs has an error
ID 14 - timeout reading saved data out of NOVRAM after start system
ID 15 - error reading data out of NOVRAM
ID 16 - error writing data to NOVRAM
ID 17 - TwinSAFE safety messages have to get acknowledged by hardware pushbutton
ID 18 - TwinSAFE errors acknowledge timeout
ID 20 - open the clamping system not allowed while a-axis is moving
ID 20 - close the clamping system not allowed while a-axis is moving
ID 20 - clean the clamping system not allowed if clamping system is closed
ID 23 - open the collet not allowed while spindle is moving
ID 24 - close the collet not allowed while spindle is moving
ID 26 - setpoint speed spindle to low < min
ID 27 - setpoint speed spindle to high > max
ID 28 - incorrect spindle characteristic setpoint
ID 29 - switch spindle to on not allowed if collet opened
ID 30 - timeout switch spindle to on
ID 31 - error spindle frequency converter
ID 32 - stop moving spindle not in expected timespan
ID 33 - spindle axis not released
ID 34 - timeout pump on -> main air error
ID 35 - timeout pump off
ID 36 - error while pump is on -> main air error
ID 37 - error pressure main air
ID38 - Cover Toolchanger not open
ID39 - Cover Toolchanger not closed
ID40 - Exhaust silde not closed
ID41 - Exhaust silde not closed
ID 50 - unknown requested tool-id, tool-id not in hmi configuration list
ID 51 - requested tool-id not in tool holder or used time or distance over
ID 52 - tool length measurement: tool length not in tolerance or tool incorrect in spindle
ID 53 - tool length measurement: tool holder is configured new with other tools on places or new tool in spindle
ID 54 - tool length measurement: no valid place in tool holder for actual tool
ID 55 - tool length measurement: no or unknown tool
ID 56 - tool length measurement: tool is broken
ID 57 - tool length measurement: tool holder is configured new with other tools on places or new tool in spindle -> tool length cannot get initialized
ID 58 - tool length measurement: no valid place in tool holder for actual tool -> tool length cannot get initialized

6.2 Zfx™ Inhouse5x Warnings

ID 1 - safety door opened -> please close the safety door manually
ID 2 - safety door unlocked -> please press the start pushbutton
ID 2 - emergency stop button still pressed
ID 4 - drive release is missing -> please press the start pushbutton
ID 5 - Axes must get referenced -> please start the reference program
ID 6 - axes referencing -> reference program running
ID 7 - service mode active - key switch in position maintenance and repair - reduced speed
ID 8 - quickstart program selected -> start will start selected program!
ID 9 - quickstart program 1 active
ID 10 - quickstart program 2 active
ID 11 - quickstart program 3 active
ID 12 - quickstart program 4 active
ID 13 - quickstart program 5 active
ID 14 - quickstart program 6 active
ID 15 - quickstart program 7 active
ID 16 - quickstart program 8 active
ID 17 - quickstart program 9 active
ID 18 - quickstart program 10 active
ID 19 - no automatic program loaded ->please choose program before start automatic
ID 20 - feedhold a-axis -> close clamp system
ID 21 - overtime standstill spindel -> please start spindel warmup program

For non-listed errors/problems, please contact the Zfx™ Inhouse5x technical services.

7. Care and maintenance

	<p>The following operations are only exerts from the complete maintenance plan: “fb wartung inhouse5x_2015-06-25_rev1_en“</p>
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Note: Do not clean the machine with compressed air. Milling chips and lubricants could get into the axis system and damage the machine.

Installation, maintenance and servicing should only be carried out by trained and authorized personnel.

7.1 Maintenance interval

Note: The maintenance intervals refer to normal operating conditions. Greater use increases the frequency of maintenance.

7.1.1 Daily maintenance

Activity	Description	Remark
Clean Collet	Check to make sure that the collet in the spindle is working properly. Clean Spindle taper and collet with brush without removing.	Collet chuck 5° D4 for Zfx™ Inhouse5x ZFX02010001
Clean Milling Chamber	Remove residual material from the milling chamber by using a brush and a vacuum cleaner. Caution: Don't use compressed air to blow out the milling chamber!	
Clean Tool Magazine	To bring the changer in different positions, use the function described in chapter 5.4.3 F7 Tool Magazine – Tools acquisition We recommend cleaning of the tool places after milling 10-15 elements. Caution: After cleaning the Tool Magazine, check all tool positions with the supplied “set-up tool”!	
Spindle warm up	If the spindle has not been running for 24 hours, run the quick start program “Program Spindle Warm-up”.	
Clean Camera	Clean and remove residual material from the camera and the glass	
Clean Viewing Window	Clean the viewing window to the milling chamber	

Removing residual material from the machining area.

Press the door release button and open the door to clean the machine.

If the machine is extremely dirty, the maintenance door may also need to be cleaned. After the machine is turned off with the Emergency Stop button, open the right side door and the flaps of the maintenance door. Then open the maintenance door toward the front.

Note: The service port can be opened only if the machine is switched off. Opening the maintenance door during operation can lead to a damage to the unit.

7.1.2 Weekly maintenance

Activity	Description	Remark
Clean Collet / Adjust	Check to make sure that the collet chuck in the spindle is working properly. Disassemble, clean and adjust collet correctly. (Described in the separate instruction "IFU_Collet chuck 5° D4 for Zfx™ Inhouse5x_2015-09-22_rev1")	Collet chuck 5° D4 for Zfx™ Inhouse5x ZFX02010001
Cleaning of the bellows	Clean bellows and lamellas from the X- and Y-axis. Replace them if necessary.	
Cleaning of the machine housing	Clean the complete machine housing with a clean, non-abrasive tissue. If necessary, use a suitable liquid cleaner.	
Lubricate Spindle housing	Lubricate spindle housing with extended Z-axis. Use a suitable maintenance spray. Caution: Risk of collision!	
Lubricate the plunger rod of the Tool Changer	Lubricate the plunger rod of the tool changer with a suitable maintenance spray.	
Emptying the chip tray	Remove, empty the tray and then reinsert it.	
Clean / Replace if necessary Swarf Filter	Clean the Swarf filter in the milling chamber under running water. Replace the filter if necessary.	Swarf filter 45ppi for Zfx Inhouse5x: ZFX02010030
Cleaning of the probe for tool length measurement	Clean the sensor with a brush / cloth and check function. <i>Note: Ensure that the cleaning is not done with too much pressure as this leads to an error message.</i>	
Suction System (incl.Suction filter) and clean/ emptying chip tray	"IFU_Suction filter for Zfx™ Inhouse5x_2015-09-22_rev1) and be sure chip tray is empty.	Suction Filter for Zfx™ Inhouse5x: ZFX02010000

Emptying the chip tray

Remove, empty the tray and then reinsert it.

Note: the tray has a weight of about 5 kg. Please consider this when you remove and reinsert it. When emptying the tray, make sure that milling particles are not inhaled. Damage to the filter, such as a tear, may lead to particle build-up and block the machine. The proper condition of the filter must therefore be guaranteed. In case of damage contact the Zfx™ Inhouse5x technical service.

Cleaning of the probe for length measurement

Wipe the contact surface of the probe (which is located on the left of the universal clamping system) thoroughly with a dry cloth.

Note: Ensure that the cleaning is not done with too much pressure as this leads to an error message.



7.1.3 Semiannual maintenance

Activity	Description	Remark
Milling Test Body	<p>To verify the accuracy of the milling machine, mill a test body every two months.</p> <p>The milling program for these samples must not be calculated as they are saved in the system. (C:\TwinCAT_Data\NC_Prog\...)</p> <p>Before milling the test body, make sure that both tools T162 and T 21 are in the tool magazine with a sufficiently lifetime.</p>	<p>Zfx™ Accurate grey 98x12: ZFX08002271 PMMA_KF_D2/4 L15/25 - T21: ZFX06000954</p> <p>PMMA_SF_D4/4 L16/27- T162: ZFX06000952</p>
Clean Coolant System incl. Filter, and if necessary replace Filter	<p>Open the Coolant Filter Cartridge with the provided tool.</p> <p>Clean the filter under running water.</p> <p>If the coolant-pressure is not enough after reinstallation, replace the filter.</p>	<p>Coolant Filter 100 µm for Zfx™ Inhouse5x: ZFX02010010</p>
Clean Metal Mesh / Splash Guard of the Front Door	<p>Dismantle the splash guard of the front door and clean it for example with a steam jet</p>	

7.1.4 Semiannual maintenance

Activity	Description	Remark
Replace Zfx™ Cutting Oil		<p>Zfx™ Cutting Oil: ZFX02002077</p>

7.1.5 Yearly maintenance

Activity	Description	Remark
Maintenance by Zfx	Yearly maintenance by authorized Zfx service technicians	<p>ZFX-Maintenance-Package - Zfx Inhouse5x: ZFX17000301</p>
Lubricate all Axes	Yearly maintenance by authorized Zfx service technicians	

8. Disposal

8.1 Qualification of personnel

The operator can recycle the machine in accordance to the provisions of the law. To disassemble the machine correctly and to separate useful materials requires a good understanding of the mechanical work and the distinction of waste materials.

8.2 Legal basis

8.2.1 Responsibilities

The operator is responsible for the proper disposal of the ZFX™ Inhouse5x. For this purpose, he may give the machine to an authorized public or private disposal plant.

Note: If the operator disposes of ZFX™ Inhouse5x through a company for disposal of waste, this user manual has to be given to them. The manual contains important notes regarding the disposal of the machine.

8.2.2 Mandatory reporting

Companies that dispose or recycle their waste are subject to regulatory approval and control. You may be exempted under certain conditions from the permit requirements, provided that they comply with the requirements of environmental protection. These companies are subject to the reporting obligation. Please see the official body responsible for environmental protection.

8.2.3 Environmental constraints

The waste must be recovered or disposed of in such a way that human health is not compromised. Only methods that do not compromise or harm the environment should be followed. In particular, care must be taken that:

- air, water and soil are not contaminated
- the animal and plant world is not compromised
- no harassment coming from noise or odors does occur
- the environment and the landscape are not involved.

8.2.4 Individual components

After the machine is disassembled, the individual parts must be divided into groups of waste. This is done in accordance to the directive of the current European Waste Catalogue (EWC) or under comparable conditions. The catalog ERC applies to all kind of waste, regardless of whether they are destined for disposal or recycling.

8.3 Disposal: Waste electrical and electronic equipment

8.3.1 RAEE

The European Commission has adopted a directive on Waste Electrical and Electronic Equipment (WEEE 2002/96/EC). As of August 2005, if there is no exemption, producers are responsible for the return and recycling of electrical and electronic equipment. The company Zfx GmbH for the Zfx milling™ Inhouse5x is exempt from this requirement.



8.4 Disposal: other parts and components

The components are made from the following materials:

1. Metals and alloys
 - Aluminium (plates, cases, etc.)
 - Copper (cooling plates, electric cables)
 - Steel (structure, housing, profiles, mounting hardware such as screws, etc.)
 - Stainless steel
2. Glass materials
 - Glass (monitor and door)
3. Resins and rubbers
 - Resins (pipes, siding, wheels etc.).
 - Rubber (gaskets, pipes, etc.)
4. Composites
 - Electrical equipment (cables, motors, components etc.).
 - Electronics (circuits, PC etc.).
5. Packaging
 - Plastic foam
 - Films, plastic
 - Wood

9. Important Customer Information

No one is authorized to give any information which deviates from those contained in these instructions.

9.1 Warranty

Zfx GmbH guarantees that this product is free from defects in materials and workmanship from a period of 12 months from the date of installation.

Zfx GmbH MAKES NO OTHER WARRANTIES INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. The user is responsible for the use and the intended use of the product. Zfx GmbH accepts no liability for defects and their consequences which have arisen or could have arisen as a result of natural wear and tear, improper handling, cleaning or maintenance, noncompliance with the maintenance, operating or connecting instructions, corrosion, impurities in the air supply or chemical or electrical influences which are unusual or not admissible in accordance with Zfx GmbH's standards. The warranty claims shall become null and void if defects or their consequences can be attributed to interventions in or modifications to the product. Warranty claims can only be validated if they are notified immediately in writing to Zfx GmbH.

If damage occurs during the warranty period of the product and is purported only obligation ZFX GmbH in the repair or replacement of the product.

9.1.1 Limitation of Liability

Zfx GmbH does not assume any responsibility for any loss or damage arising from this product, regardless of whether they are direct, indirect, special, incidental or consequential, regardless of the legal basis, including warranty, contract, negligence or misconduct.