



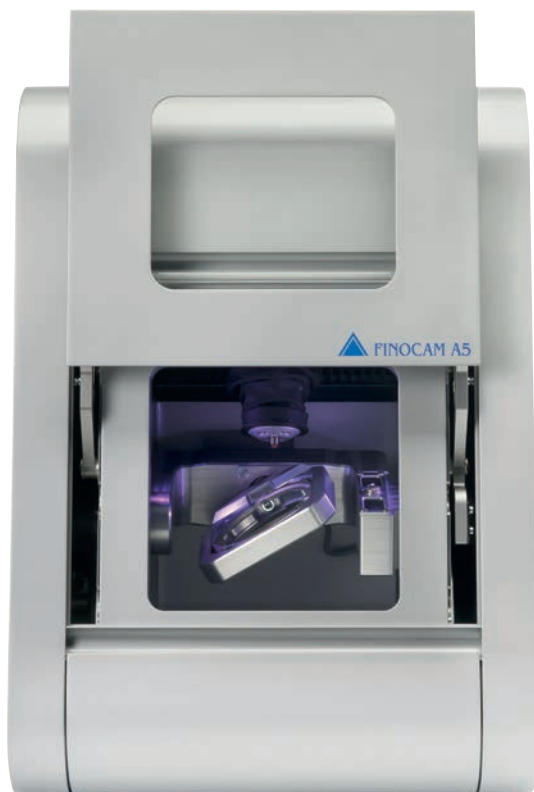
# FINOCAM A5

Original FINO

Germany

06260DE

Tischfräsmaschine  
Table Milling Unit



FINO · der feine Unterschied · the fine difference · la fine différence · la fina diferencia · la fine differenza

Gebrauchsinformation · User Information · Mode d'emploi  
Información sobre el uso · Informazioni d'uso  
Gebruiksaanwijzing · Instrukcja stosowania

# CONTENTS

<b>1. About this document</b>	<b>3</b>
• Used symbols • Structure of safety notes	
<b>2. Safety instructions &amp; regulations</b>	<b>3</b>
• General safety instructions • Regulations	
<b>3. Machine description</b>	<b>6</b>
• Connection panel • Front cover • Working chamber • Accessories container • Air extraction concept • Manufacturing software and computer • Sound emission • Technical data	
<b>4. Installing the machine</b>	<b>11</b>
• Checking the scope of delivery • Choosing the installation site • Machine installation (scheme) • Installing the pneumatics • Installing the air extraction system • Establishing the electric connection • Removing the transport lock • Connecting the manufacturing computer • Testing the machine	
<b>5. Running the machine</b>	<b>18</b>
• Starting up the machine • Job execution overview • Inserting/changing tools • Inserting and removing workpieces • Executing jobs • Interrupting the job execution • Operation interruption or abortion of job execution • Emergency release of the front cover	
<b>6. Machine maintenance and cleaning</b>	<b>25</b>
• Definition of wear parts • Maintenance table • Inspection • Cleaning the working chamber and measuring key • Cleaning the collet chuck • Checking the hoses, cables and connections • Cleaning the housing • Checking the service unit • Exchanging the main fuse • Calibrating the axes • Replacing the tool changer inserts	
<b>7. Disposal</b>	<b>32</b>
<b>8. Troubleshooting</b>	<b>32</b>
<b>9. Index</b>	<b>36</b>

# 1. About this document

## 1.1 Used symbols

### Instructions

- General instruction
- M** Specific manual action
- S** Specific action in the manufacturing software
- ➔ Result

### Additional symbols

- ↷ Cross reference
- List
- ✦ Information to make work more efficient.
- ⚠ Important instructions without any danger for people or objects.
- ⓘ Additional information

## Structure of safety notes



### Type and source of hazard

Further explanations and consequences when ignoring hazards.

- Instructions to avoid hazards.

The following signal words may occur in this document:



DANGER indicates a hazardous situation which will result in death or serious injury.



WARNING indicates a hazardous situation which can result in death or serious injury.



CAUTION indicates a hazardous situation which, if not avoided, can result in minor or moderate injury.



NOTICE indicates a situation which can lead to physical damage of the product or in the surrounding area(s).

# 2. Safety instructions & regulations


## 2.1 General safety instructions



### Incorrect operation of the machine

- Read this document carefully **before** installing and operating the machine.
- If it is unclear how to operate the machine in any way, do not use the machine and contact customer service.
- Make sure that every user has access to this document.
- Instruct every user on safe and proper machine handling.

### Danger to life due to an electric shock

 If you come into contact with electrically charged parts, you can suffer from an electric shock. Water increases the risk significantly.

- Do not remove the housing of the machine.
- Only have qualified electricians work on any electric equipment.
- Run power cables so that they cannot be damaged by sharp edges.
- In the following cases, disconnect the machine from the electrical source immediately and prevent it from being restarted:
  - When machine connections, compressed air hoses or electric cables are damaged
  - **Before** you check or run electric cables
- Never perform any troubleshooting while the machine is operating.
- Only have authorized service technicians repair the machine.
- Replace damaged cables with original manufacturer's spare parts.
- Install an operational Residual Current Device/ Ground Fault Circuit Interrupter on the electric circuit of the machine.
- Do not touch the machine and especially the cables with wet or damp hands.
- Remove any liquids near the machine immediately.



## **WARNING**

### **Respiratory diseases when processing harmful materials**

If you inhale harmful materials during their processing, your respiratory tracts may be damaged.

- Only process materials when an air extraction system is running.
- Avoid materials which can damage your health during dry machining.
- Use a suction device with an extra-fine particle filter.

### **Crushing hazard and risk of cutting injuries through moving machine parts**



Through the moving axes and the rotating spindle you can suffer bruises and cuts.

- Only operate the machine when the front cover is closed and the safety interlock is activated.
- Store the key for the emergency release in a place where only authorised persons have access.
- Do not circumvent or deactivate safety devices of the machine.
- Check the machine regularly for damage, especially the safety devices.
- Have damaged safety devices repaired by an authorised service centre unless stated otherwise in this document.
- Use only original manufacturer's equipment and original spare parts in the machine.
- Keep children and animals away from the machine.
- Do not remove the housing of the machine.


### **Administrator mode: risk of cutting injuries and bruises as well as hazards through ejected debris**

If you operate the machine in "Administrator mode" with the front cover open, the risk of injury is increased significantly!

- Operate the machine in "User" mode only unless you have been authorised by FINO GmbH to use other profiles.
- Even if you are an authorised user, use the "Administrator mode" with the front cover open only when necessary.


- While in "Administrator mode": Do not reach into the working chamber while the axes are moving or during machining. 
- While in "Administrator mode": Everyone within reach of the machine must wear protective eye wear. 

### **Hearing damage due to loud noise**

- In case of extraneous machining noise check the working conditions: Ensure that the workpiece is fixed properly, and verify the condition of the tool and the material you are using.
- If loud noise cannot be avoided, wear ear protection during processing. 

### **Risk of injuries through loose pneumatic components under air pressure when connections are open**

Loose pneumatic components can move extremely fast and unpredictably and may cause injury.

- Before you run the pneumatic hoses, close the compressed air supply valve.
- Before you check the pneumatic hoses and pneumatic connections, set the air pressure to a minimum value.
- In case of defective machine connections and pneumatic hoses, disconnect the machine from the external compressed air supply and the electrical source to prevent it from being restarted. 
- Contact customer service if connections are damaged or defective.

**CAUTION**

**Trip, fall and slipping hazards**

- Keep the working environment and installation site clean.
- Run cables in such a way that persons cannot trip over them.



**Risk of cutting injuries and burns**

If you touch tools or sharp edges on workpieces or the machine, you may suffer from cuts. If you touch the hot spindle body or hot tools, you may suffer from burns.

- Wear gloves when you perform manual work at the machine or with workpieces/tools.

**Reduced ability to act with insufficient lighting**

In case of an insufficient lighting your judgement and/or your precision may be reduced.

- Make sure that the lighting in your working environment is sufficient.

**Risk of injury in case of malfunctions caused by insufficient maintenance**

If you do not maintain the machine as often as is required, malfunctions may occur which can lead to injuries.

- Take note of the intervals and conditions mentioned in the maintenance table in this document and carry out the respective maintenance steps accordingly.

**Health risks through constant malpositioning if your working environment is not sufficiently ergonomic**

Over the long run, an improper or one-sided positioning can be a risk to your health.

- Set up an ergonomic work environment.
- Ensure the seat height and monitor position is ideal and the lighting is sufficient.

**2.2 Regulations**

If you violate the following regulations, you may lose your entitlement for benefits. In addition, we cannot be held liable for any damage resulting from such violations.

**2.2.1 Intended use**

The FINOCAM A5 has been designed for easy to medium machining work in the dental sector.

- Only process materials that you can select in FINOCAM. Only use the machine commercially.
- Before creating jobs, verify if the objects being prepared may be utilized at the place of use according to local and/or national regulations or other authorized organisations or entities (e. g. professional associations, health authorities). In particular, verify if the material is approved for the machined object type and if the object type is designed in accordance with applicable regulations. Neither the manufacturing software nor the CNC machine will inform you about possible regulatory infringements, but will executes jobs in accordance with the preferences and materials set by the user.
- Verify that each object type and each material in your jobs are authorized to manufacturing materials. If mandated by local or national regulations, obtain relevant authorization from the responsible organisation or entities (e. g. professional associations, health authorities).
- Only manufacture objects which correspond to the object types that you can select in the import view in FINOCAM. While you can import/manufacture any other objects as well, neither the manufacturing software nor the CNC machine are designed for these other objects and should not be used in this way.
- Do not manufacture implants or parts of objects that are designed to have contact with implants. These parts include parts of two-part abutments which contain the connection geometry for the implant. Do not manipulate the connection geometry of prefabricated abutments (“prefab abutments”) and you must always check finished objects for accurate connection geometries (i.e. that connection geometries of finished jobs have not been damaged).

## 2.2.2 Controlling the machine through software

You control the CNC machine through specially designed applications which are supplied with the machine.

- Only use program versions that are officially released for the machine.
- Always use the newest program versions that are available for the machine.
- Before installing or operating the machine, be sure to read the documentation for the applications.

## 2.2.3 Maintenance and cleaning

- Clean and maintain the CNC machine as required. Only then can the machine reach a long service life.
- Only carry out maintenance work which is described in this document. Otherwise you risk your health and may damage the machine.

## 2.2.4 Synchronous spindle SFK 300P

- Do not use unbalanced tools at high rotational speeds. Such an imbalance puts a great strain on the spindle's ball bearings, which can cause the bearings to be damaged.
- When working in the working chamber, do not apply manual pressure against the spindle.

## 2.2.5 Unattended operation


- Unattended operation of the CNC machine should only occur if the following conditions are met:
  - The national and local laws allow it.
  - The working chamber of the machine is completely clean.
  - Unauthorized users cannot access the machine.
  - The room in which the machine is located has an automatic fire detection system.

## 2.2.6 Transportation and storage

### NOTICE

### Damaging of the machine if you transport the machine without the transport lock

If you transport the machine without installing the transport lock first, the machine may get damaged.

- Before every transport, install the transport lock as it was installed at delivery
  - Ambient temperature: between 10 °C and 35 °C
  - Relative air moisture: max. 80 %, non-condensing
  - For (un)packing and positioning two people are required
  - Weight of the machine: approx. 91 kg
- Always transport multiple machines individually and do not stack them. 
- Only trained transport personnel may transport the machine to the installation site.
- Always transport the machine in an upright position.
- Transport and position the machine only with a closed accessories container.
- In case of overseas transport, take proper measures against corrosion.
- To carry the machine, use the left and right grips located on the bottom of the machine.

## 3. Machine description

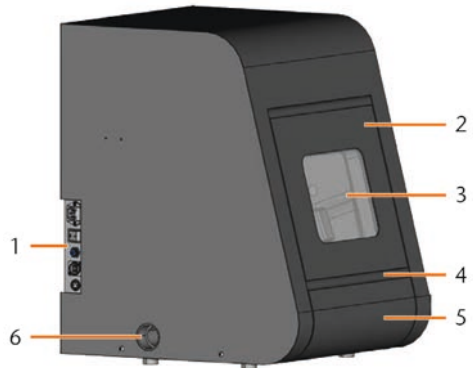


Fig. 1: Front view of the FINOCAM A5

- 1 Connection panel (⇒ Fig. 2)
- 2 Front cover
- 3 View window to the working chamber
- 4 Recessed grip for opening
- 5 Accessories container
- 6 Opening for the air extraction system

With your FINOCAM A5 you can process workpieces of different materials to create high quality objects for the dental sector.

You can find a list of the materials which you can process with the FINOCAM A5 in the FINOCAM manufacturing software.

### 3.1 Connection panel

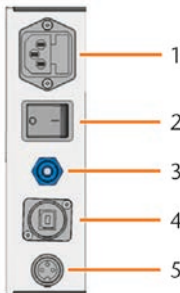


Fig. 2: The connection panel

- 1 Power connection 100 – 240 V AC, 50/60 Hz, including glass fuse T6,3A L250V
- 2 Main power switch
- 3 Pneumatic connection
- 4 USB connection
- 5 Switching output for suction device

### 3.2 Front cover

The front cover locks the working chamber and protects the user from injuries during operation.

#### **⚠ CAUTION**

#### **Crushing hazard when opening or closing the front cover**

When you open or close the front cover, the moving front cover may crush your fingers.

- When you open and close the front cover, use one hand and keep the other hand away from the machine.
- When you close the front cover, ensure your hands do not get caught between the front cover and the machine housing.

#### **NOTICE**

#### **Damaging of the machine when opening the front cover by force**

When the CNC machine is not supplied with power or when the axes are moving, the front cover remains locked. If you open the locked front cover by force, the machine may get damaged.

- Never open the front cover by force.
- Connect the machine to the electrical source and switch it on first before opening the front cover.
- To open the front cover, grasp the recessed grip and pull the front cover upwards.

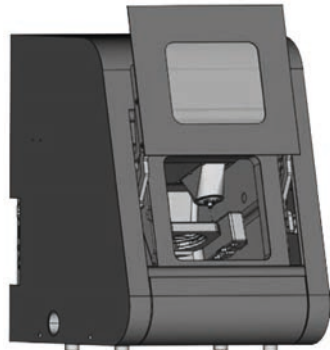


Fig. 3: The FINOCAM A5 with the front cover open

- To close the front cover, put your hand flat on the upper edge of the front cover and push the front cover downwards.

### 3.3 Working chamber

The machine processes all workpieces in the working chamber.

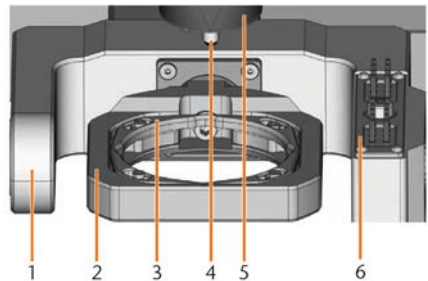


Fig. 4: The working chamber of the FINOCAM A5

- 1 Rotational axis B
- 2 Workpiece holder and rotational axis A
- 3 Fixing disc
- 4 Collet chuck for picking up tools
- 5 Spindle
- 6 Tool changer for up to 16 tools

### Colours of the working chamber lighting

① If the working chamber lighting is insufficient, provide additional lighting.

Your FINOCAM A5 illuminates the working chamber in different colours. The colour will change depending on the state of the machine. You will find the colours and respective machine statuses in the following table:

Colour	Status
Green	Machine is ready, front cover closed
White	Machine is ready, front cover closed
Blue	Machine is executing a job
Red	A machine malfunction has occurred

### 3.4 Accessories container

In the accessories container below the working chamber, you can store workpieces, tools, and the spindle service set ready to hand.

➤ To access the accessories container, simply pull it out of machine.

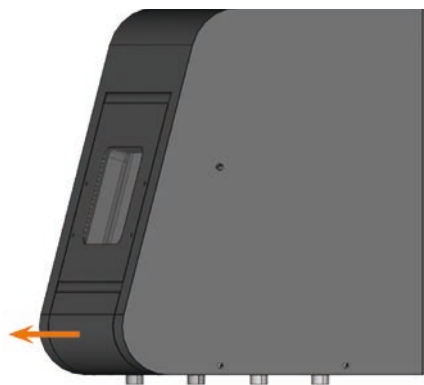


Fig. 5: Opening the accessories container

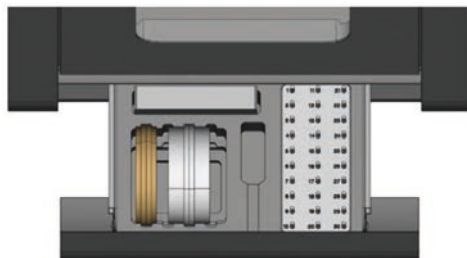


Fig. 6: The open accessories container (blanks and tools not provided)

➤ To close the accessories container, push it into the machine until it is completely closed.

### 3.5 Air extraction concept

The air extraction concept consists of:

- Air that is emitted from the spindle and the bellow
- The external air extraction system (suction device, suction hose, optional switching unit)
- The vacuum sensor

During job execution, the machine constantly blows air into the working chamber (⇒ Fig. 7, upper arrows). An external suction device that you connect to the CNC machine with a suction hose extracts the machining debris from the working chamber (⇒ Fig. 7, lower arrow).

This concept decreases the soiling and wear of sensitive machine parts.

① The air extraction system **does not replace the regular cleaning of the machine. Without regular cleaning, the machine life decreases significantly.**

Through the air extraction, a vacuum develops in the working chamber which is constantly monitored by a vacuum sensor (display in FINOCNC: ⇒ chapter 4.9). If the vacuum is too weak, machining is not possible. If the vacuum becomes too weak during a running job, FINOCNC interrupts machining until the vacuum is sufficient again (⇒ chapter 5.7).

The current strength of the vacuum displays in FINOCNC (⇒ chapter 4.9 or in documentation for the manufacturing software).



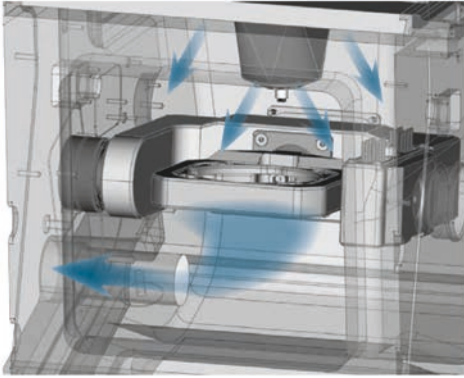


Fig. 7: Air extraction concept in the working chamber

### 3.6 Manufacturing software and computer

To operate the machine, you must use a computer running Windows® (“manufacturing computer“) which should connect to the machine via the provided USB cable.

You can process manufacturing jobs with the manufacturing computer in 2 steps:

1. With FINOCAM you can create jobs with the objects that you want to machine. FINOCAM already contains all important parameters for the different materials.
  2. You can execute the jobs with the CNC software FINOCNC. This application offers additional maintenance and control functions for the machine.
- ① You must use a different computer together with a scanner and suitable software to create 3D models of the objects (not provided, sold by specialist dealers).

### 3.7 Sound emission

The actual sound emission of the machine varies heavily depending on the manufacturing material and the machining conditions.

- If the machine is too loud, check the operating conditions. Ensure that the workpiece is fixed properly, check the condition of the tool and the material in use.
- If loud noise cannot be avoided, wear ear protection during machining.

### Sound measurement

Measuring conditions:

- Processed material: CoCr
- Tool status: new
- Distance to sound source: 1 m
- Measurement according to ISO 3746, engineering method 3

Operating condition	Maximum A-weighted sound pressure level
Processing	71 dB(A)
All other operating conditions (tool change, movement of the axes etc.)	<70 dB(A)

### 3.8 Technical data

#### Base system

- Dimensions (W/D/H): approx. 450 x 530 x 630 mm
- Weight: approx. 91 kg
- Air pressure (min./max.): 6 bar/8 bar
- Recommended air pressure: 7 bar
- Air consumption: ca. 40 l/min at 6 bar, approx. 50 l/min at 8 bar
- 5-axis mechanism; positioning range (x/y/z): 165.5 x 108 x 93 mm
- Complete housing of the working chamber; front cover with a safety contact and safety interlock
- Vacuum sensor for monitoring the extraction capacity
- Minimum extraction capacity: 2500 l/min
- Accessories container in drawer shape
- Working chamber lighting with different colours to indicate the machine state

#### Rotary axes

- Rotation range: 360 ° (A) | ±35 ° (B)
- Exchangeable workpiece holder

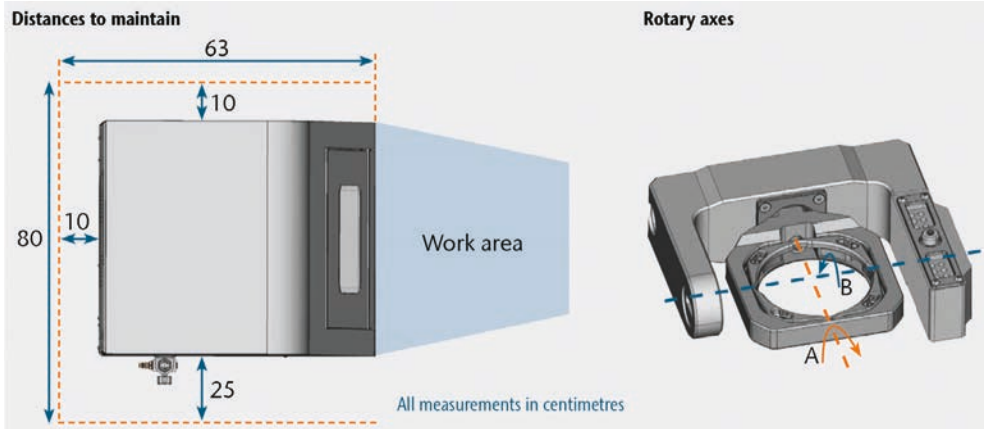
#### Spindle

- Synchronous spindle rotating up to 60,000 RPM
- Nominal power under continuous load (S1): 300 Watts
- Maximal Power (Pmax): 500 Watts
- 4-fold bearing
- Hybrid ceramic ball bearing
- Pneumatic collet chuck ø 3 mm
- Cone cleaning and sealing air

## Tool changer

- Automatic tool changer for 16 tools
- Maximum tool length: 40 mm
- Automatic tool length measurement and tool breakage monitoring via measuring key
- Compressed air monitoring for the automatic tool change

① For additional information on tools see ➔ chapter 5.4.



## 4. Installing the machine

### 4.1 Checking the scope of delivery

M Unpack the machine and ensure you have received the following items:



1



2



3



4



5



6



7



8



9



10



11



12



13



14

- 1 1 CNC machine FINOCAM A5
- 2 1 spindle service set in the accessories container
- 3 1 power supply cord
- 4 1 USB cable
- 5 1 service unit for compressed air
- 6 1 torque wrench 1.5 Nm in the accessories container
- 7 1 drill bit (2.8 mm) for tool positions
- 8 1 calibration set: 1 micrometre, 3 blanks, 1 calibration tool
- 9 1 measuring pin
- 10 1 key for the emergency release of the front cover
- 11 1 Advanced Tool Board (ATB) in the accessories container
- 12 1 pneumatic hose
- 13 2 tool changer inserts (as spare parts)
- 14 1 USB dongle

Without illustrations:

- This document
- Documentation for FINOCAM & FINOCNC
- 1 socket wrench in the accessories container for replacing the measuring key (to be used by the service technician)
- 4 screws for the workpiece fixation as spare parts
- Please keep the machine packaging for future transport.

### 4.2 Choosing the installation site

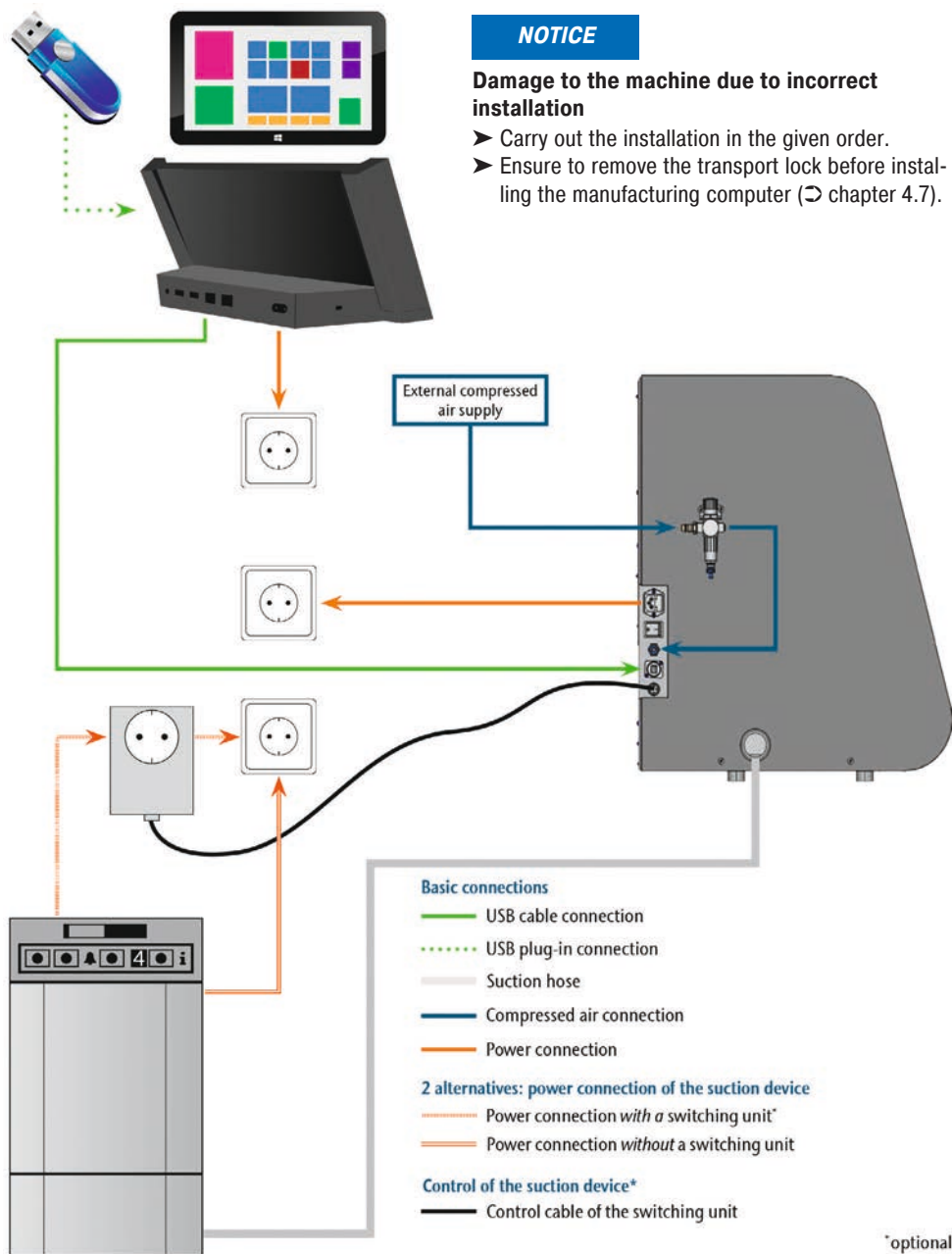
- The installation site must meet the following criteria:
  - Firm and even surface, must carry the weight of the machine
  - Room temperature ideally between 18° Celsius and 25° Celsius, maximum room temperature 32° Celsius
  - Machine location must be dust-free
  - Relative air moisture maximum 80 %, non-condensing
  - Alternating current source with 100-240 V and 50/60 Hz
  - Compressed air supply that meets the requirements of the machine (⇒ chapter 4.4)
  - Sufficient space at the sides of the machine (⇒ page 10)

### 4.3 Machine installation (scheme)

#### NOTICE

#### Damage to the machine due to incorrect installation

- Carry out the installation in the given order.
- Ensure to remove the transport lock before installing the manufacturing computer (➔ chapter 4.7).



## 4.4 Installing the pneumatics

### **WARNING**

#### Risk of injuries through leaking compressed air and lashing pneumatic hoses

Open or loose pneumatic connections can cause severe injuries.

- Make sure that **during installation** and service of the pneumatic hoses and of the service unit compressed air is not running through the hoses and connections.
- After installing the pneumatic hoses but **before** running compressed air through the hoses and connectors, check if the hoses are securely inserted into the correct connectors and are not damaged.
- Do not run compressed air through damaged hoses and connectors.

### **NOTICE**

#### The spindle may suffer bearing damage and electrical damage if the compressed air is contaminated

The incoming compressed air must be **dry** and **oil-free** according to ISO 8573-1 because the service unit only serves as an **indicator** for contaminated air.

#### Air purity according to ISO 8573-1

Solid particles, Class 3, Filtration degree better than 5 µm for solid particles
Water content, Class 4, Maximum pressure dew point +3 °C
Residual oil content, Class 3, Maximum oil content: 1 mg/m <sup>3</sup>

- Ensure that the compressed air meets the above requirements.
- Connect the machine to the compressed air supply only via the provided service unit.

The spindle requires compressed air for the following tasks:

- For the opening and closing of the collet chuck during tool change.
- For the sealing air which prevents foreign bodies from entering the spindle.

Air consumption of the machine:

- approx. 40 l/min at 6 bar
- approx. 50 l/min at 8 bar

## 4.4.1 Overview service unit

Via the service unit you connect the CNC machine to your compressed air supply and regulate the incoming pressure for the machine.

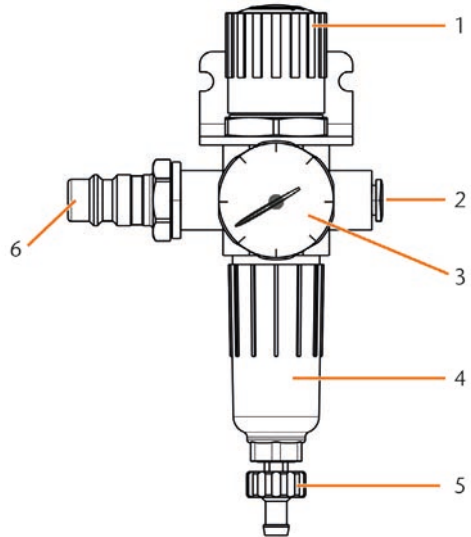


Fig. 8: The service unit:  
Regulation and checking the air pressure

- 1 Rotary knob for pressure regulation
- 2 Pneumatic connection to the machine (ø 6 mm)
- 3 Manometer for monitoring the outgoing pressure
- 4 Water separator
- 5 Discharging screw
- 6 Pneumatic connection for external compressed air supply

## 4.4.2 Mounting the service unit on the CNC machine

### **NOTICE**

#### Failure of the water separator caused by a wrong alignment of the service unit

The service unit must **always** be mounted in an **upright position** because otherwise the water separator will not work.

- Mount the service unit in an upright position (⇨ Fig. 8). On the left side of the CNC machine are two drilled holes which you can use to mount the service unit on the machine.

- M1. Remove the two blind screws in the drilled holes.  
 M2. Mount the service units with the provided lens head screws in an upright position.

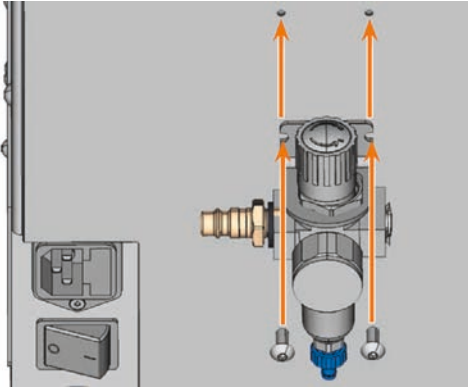


Fig. 9: Mounting the service unit on the machine

#### 4.4.3 Installing the pneumatic hoses to the service unit

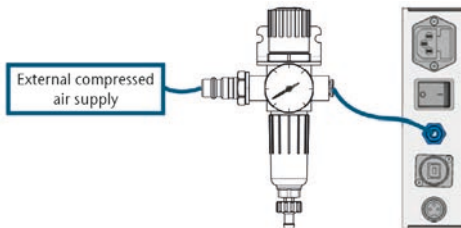


Fig. 10: Installation of the service unit (scheme)

- M1. Close the external compressed air supply valve.  
 M2. Use the provided pneumatic hose to connect the right pneumatic connection of the service unit [Fig. 8, 2] with the pneumatic connection of the machine.  
 M3. Connect the external compressed air supply with the left pneumatic connection of the service unit [Fig. 8, 6].  
 M4. Check the installation carefully for errors and damage. Do not run compressed air through damaged or loose hoses and connections!  
 M5. Open the external compressed air supply.  
 M6. Check the air pressure on the manometer [Fig. 8, 3]. If it does not lie between 6 bar and 8 bar, adjust it with the service unit (↪ chapter 4.4.4)

#### 4.4.4 Adjusting the air pressure with the service unit

Setting the air pressure is only necessary if the air pressure shown by the manometer does not lie between 6 bar and 8 bar.

- M1. Check if the service unit is correctly connected to the machine and the compressed air supply (↪ chapter 4.4.2 onwards).  
 M2. Pull the rotary knob on top of the service unit slightly upwards.  
 M3. Turn the rotary knob in the desired direction until the pressure lies between 6 bar and 8 bar (recommended: 7 bar):
- Turning it towards “+” you increase the pressure
  - Turning it towards “-” you decrease it
- M4. Push the rotary knob down again.  
 ➔ The knob is locked and cannot be changed inadvertently.

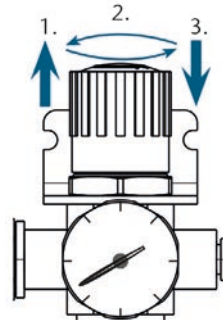


Fig. 11: Setting the air pressure

#### 4.5 Installing the air extraction system

- ① **How the air extraction system works:**  
 ↪ chapter 3.5

Available components of the air extraction system:

- Suction device including suction hose
- Switching unit for switching the suction device on and off via the CNC machine
- Hose connection for suction hose: if the suction hose does not fit into the machine

Which components are required and how you can combine them is listed in the following table.

Component	Source	Required?	Prerequisite
Suction device	Customer service, specialist dealers	Yes	–
Switching device	Customer service	Nein	–
Hose connection	Customer service	If the suction hose does not fit	Ask customer service

You obtain the switching unit via customer service if necessary.

### 4.5.1 Requirements for the suction device

- Use a suction device with the following properties *only*:
  - Designed for the commercial use in the dental sector
  - Equipped with a filter of the filter class M
  - Suitable for the operating site of the CNC machine
  - Equipped with safety devices which protect you from static discharges (e. g. through an anti-static suction hose)
  - Minimum extraction capacity: 2500 l/min

### 4.5.2 Absauggerät anschließen

- Before the installation of the suction device read the documentation for the device and have the documentation always ready at hand.
- M1. Check if the connection of the suction hose has an outer diameter of 45 mm. If the diameter is different, use the optional hose connection (➔ chapter 4.5.3.)
  - M2. Insert the suction hose of the suction device into the opening for the air extraction of the CNC machine. Make sure that the suction hose is firmly connected.

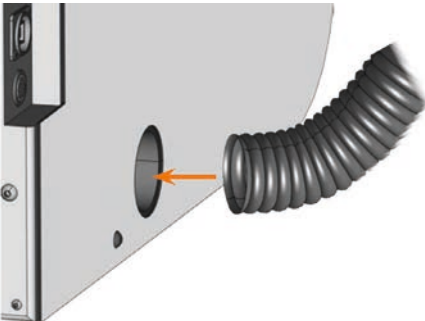


Fig. 12: Inserting the suction hose into the machine

- M3. If you want the machine to automatically switch the suction device on and off, install the switching unit (➔ chapter 4.5.4. If you require a switching unit, contact customer service.
- M4. Continue with the installation of the suction device as described in the documentation for the device.

### 4.5.3 Connecting the suction hose with the optional hose connection

- Ⓞ If you can connect the suction hose of your suction device directly to the CNC machine, you do not need the hose connection.
- M1. Obtain the hose connection via customer service.
  - M2. Turn the thread of the hose connection counter-clockwise until the connection is completely open. If the thread gets detached from the hose connection, place it onto the connection again and turn it clockwise once so that it is screwed to the connection again.
  - M3. Insert the suction hose of the suction device completely into the hose connection on the side of the thread.

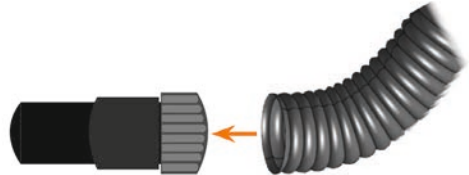


Abb. 13: Inserting the suction hose into the hose connection

- M4. Turn the thread of the hose connector clockwise up to the stop.
  - ➔ The suction hose is firmly attached to the hose connection.
- M5. Insert the hose connection into the opening for the air extraction system of the machine. Ensure it is firmly connected.



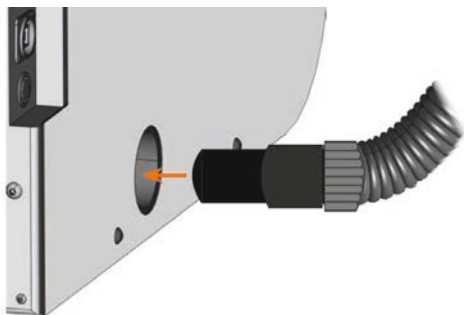


Fig. 14: Inserting the hose connection into the opening for the air extraction system

➔ The installation of the suction hose with the optional hose connection is complete.

#### 4.5.4 Installing the switching unit

M1. Connect the power cable of the suction device to the switching unit.

M2. Connect the control cable of the switching unit to the switching output at the connection panel of the CNC machine.

M3. Plug the switching unit into a power socket.

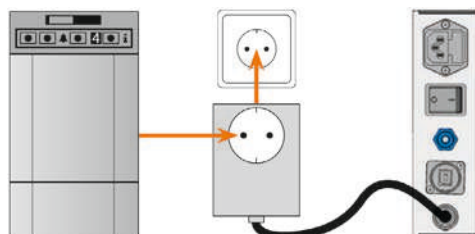


Fig. 15: Connecting the switching unit to the suction device and the machine

#### 4.6 Establishing the electric connection

##### NOTICE

##### Damaging of the machine through heavy voltage fluctuations

Heavy voltage fluctuations can disrupt the control unit and can cause system failure.

➤ Plug the machine's power cord in a dedicated circuit current or ensure that no devices are connected that can cause heavy voltage fluctuation when switched on.

##### NOTICE

##### Damaging of the machine if the transport lock and the manufacturing computer are installed

When you connect the machine to the electrical source and the manufacturing computer is connected, the machine starts referencing. During this process, the transport lock which is installed at delivery can damage the mechanics of the machine.

- Do not connect the machine to the electrical source if the manufacturing computer **and** the transport lock are installed.
- If the transport lock is installed, disconnect the USB connector between the machine and the manufacturing computer **before** connecting the machine to the electrical source.

M1. Plug the provided power cord into the power connection at the connection panel of the CNC machine.

M2. Put the plug of the cord into a socket that is protected by a Residual Current Device/Ground Fault Circuit Interrupter.

#### 4.7 Removing the transport lock

Before operating the machine for the first time, you must remove the transport lock. The transport lock prevents the spindle from getting damaged during transport.

M1. Disconnect the USB connector between the machine and the manufacturing computer.

M2. Connect the machine to the electrical source.

M3. Switch on the machine via the main power switch.



Fig. 16: Turning on the main power switch

M4. Open the front cover.



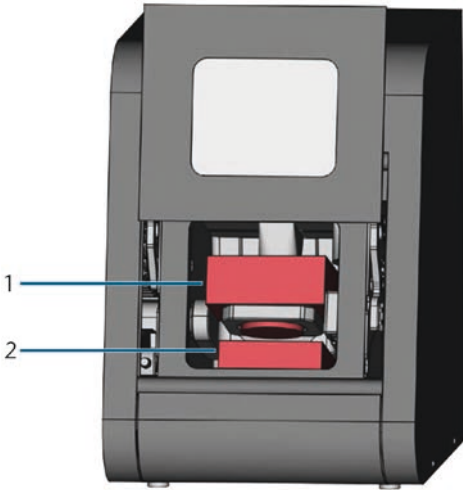


Fig. 17: Removing the transport lock




- 1 Upper part of the transport lock
- 2 Bottom part of the transport lock

- M5. Carefully pull the bottom part of the transport lock (2) towards you and out of the working chamber.
- M6. Carefully lift the upper part of the transport lock (1) out of the workpiece holder. Pull it towards you and out of the working chamber.
- M7. Clean the working chamber from parts of the transport lock that may have broken off.
- M8. Store the transport lock safely to use it for future transports.

#### 4.8 Connecting the manufacturing computer



Ⓛ The transport lock must not be installed when you connect the manufacturing computer to the machine (➔ chapter 4.7).

- M1. Switch on the machine.
- M2. Close the front cover.
- M3. Start the manufacturing computer.
- M4. Use the provided USB cable to connect a USB port of your computer or docking station with the connection panel of your CNC machine.
- M5. Insert the dongle into a USB port of the manufacturing computer or docking station.
- M6. Install the newest version of FINOCAM and FINOCNC that is released for the machine. For more information on this, read the documentation for the applications.

- S7.  Start FINOCNC and click on the depicted icon in the icon bar.
- S8.  Click on the depicted icon in the lower icon bar.
  - ➔ The application settings view displays.
- S9.  Click on the depicted icon beside the text **Port number**.
  - ➔ FINOCNC will try to establish a connection to the CNC machine. If this is successful, the application will display the port number beside the icon and the machine references.
  - Ⓛ The machine will not reference if the front cover is open.
- M10. If the front cover was open at step S9, close it. If the machine does not reference as a result, quit FINOCNC and restart the application.
- M11. If FINOCNC did not determine the port number, read how to determine the port number manually in the documentation for the application.

#### 4.9 Testing the machine


After the first installation or after a re-installation, for example after a transport, you should test the basic functions of the machine.

- M1. Switch on the machine.
- M2. Close the front cover.
  - ➔ The machine starts up. The working chamber is illuminated in white.
- M3. Open the compressed air supply valve.
- S4. Start the manufacturing computer and start FINOCNC.
  - ➔ The machine will reference and the working chamber will illuminate in green. The machine is now in *default position*.
- S5.  In the upper icon bar, click on the depicted icon.
- M6. Switch on the suction device and select the necessary extraction level.
- S7.  If the machine controls the suction device via a switching unit, click on the depicted icon.
  - ➔ The suction device is operating and a vacuum develops in the working chamber.
- M8. With the value bars and icons depicted below, verify that the compressed air and the vacuum in the working chamber are sufficient.


- ➔ The icons display in blue when the compressed air and the vacuum are sufficient.




Fig. 18: Top: Value bar and icon for compressed air  
Bottom: Value bar and icon for the vacuum

- S9.  Move the spindle to the cleaning position by clicking on the depicted icon.

- ➔ The spindle should move through the working chamber at constant speed.

- S10.  Move the spindle from the cleaning position back to the default position by clicking on the depicted icon.

- ➔ The spindle moves to the default position at constant speed.

- S11.  If the machine controls the suction device, click on the depicted icon.

- M12. If you control the suction device manually, switch it off. The suction device stops operating.

- M13. Open and close the front cover.

- ➔ The front cover can be opened and closed easily.

- M14. If a result did not occur as described, check the following depending on the error:

- The USB connection & USB driver installation (➔ chapter 4.8 & documentation for the manufacturing software)
- The compressed air supply (➔ chapter 4.4)
- The set extraction capacity of the suction device
- The installation of the air extraction system (➔ chapter 4.5)

- M15. If you cannot solve a problem that occurred, contact customer service.

## 5. Running the machine

### 5.1 Starting up the machine

- M1. Close the front cover.

- M2. Switch on the machine and the manufacturing computer.

- ➔ The machine and manufacturing computer start up. When the machine has started up, the working chamber is illuminated in white.

- M3. If machine controls the suction device, switch on the device and select the necessary extraction level.

- ➔ The suction device **is not** running.

- Ⓢ If you control your suction device manually, you switch on the device immediately before job execution.

- S4. Start FINOCNC.

- ➔ The machine references. Afterwards the working chamber is illuminated in green. The machine is now ready for use.

- Ⓢ The machine will not reference if the front cover is open.

- M5. If the working chamber is illuminated in red, switch the machine off and on again. If the working chamber is still illuminated in red, contact customer service.

- M6. If the front cover was open at step S4, close it.

- S7. If the machine does not reference as a result, quit FINOCNC and restart the application.

### 5.2 Job execution overview

#### NOTICE

#### Damaging of the machine when using damaged tools or workpieces

If tools or workpieces are damaged, parts can break off and damage the machine during job execution.

- Check the workpieces and tools **thoroughly** for damage before every job execution.

Carrying out a typical job with the FINOCAM A5 is as follows:

1. Create a job in FINOCAM
2. Insert the tools into the machine
3. Insert the workpieces into the machine
4. Execute the job in FINOCNC

The steps in the manufacturing software are described in the corresponding documentation. The following text describes how to perform manual work with the CNC machine.

### 5.3 Inserting/changing tools

**NOTICE**

**Damaging of the spindle or the tool positions if you use improper tools**

Improper tools can damage the collet chuck of the spindle and/or the tool positions.

- Only use tools with a sufficiently large chamfer at the tool shank.
- Install a retaining ring as a stop ring according to DIN 471-A3.
- Only insert tools with a maximum diameter of 3 mm at the thickest part into the collet chuck.
- Only insert tools with a maximum cutting edge diameter of 2.6 mm into the tool changer.
- ✦ We recommend original tools as they are designed especially for the designated jobs.

You can insert up to 16 tools into the tool changer. The machine can change tools automatically during machining so that it executes jobs without your interference.

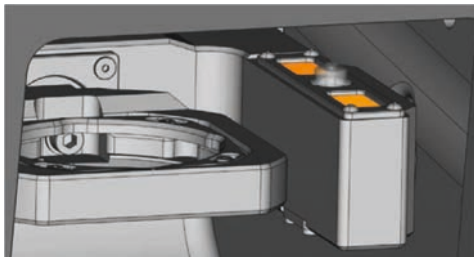


Fig. 19: Tool changer positions in the working chamber of the machine (marked orange)

You can equip the tool changer in two ways:

- Via the spindle – you insert a tool into the collet chuck and the spindle will deposit the tool in the tool changer. This function is described in the documentation for the manufacturing software.
- By inserting the tools into the tool changer manually. This is described below.

You insert the tools manually as follows:

S1. Start FINOCNC.

S2. Call up the job execution view and select the job that you want to execute from the job list.

➔ FINOCNC displays the tools that are assigned to the job in the lower part of the application window.

M3. Open the front cover.

M4. Insert the tools into the tool positions of the tool changer:

- Insert the tools straight into the tool positions and push them in until the ring touches the rubber (➔ Fig. 20).
  - The positions of the tools in the tool changer must match the tool positions in FINOCNC (➔ Fig. 21).
- Ⓢ If the positions of the tools in the tool changer do not match the tool positions in FINOCNC, the machine will use the wrong tool(s) during job execution and the job result will become unusable.

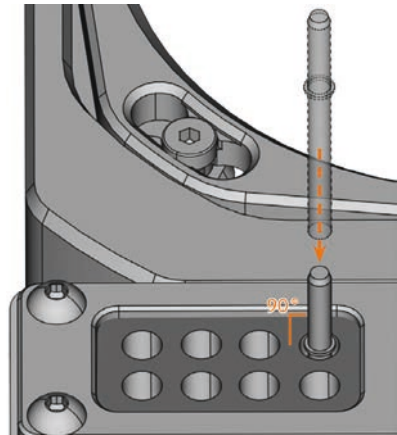
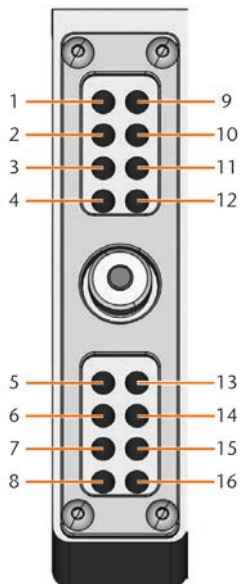


Fig. 20: Inserting tools straight into the tool position



1	T260 G	7.2	9	R100 N	12.0
2	R100 G	9.6	10	R060 K	12.0
3	R200 NEM	6.0	11	F120 N	12.0
4	R060 Z	12.0	12	R100 K	12.0
5	R200 NEM	6.0	13	R200 K	12.0
6	R060 K	12.0	14	R100 G	9.6
7	F120 K	12.0	15	R200 N	12.0
8	R200 N	12.0	16	R100 NEM	5.7

Fig. 21: Top: tool positions 1 – 16 in the tool changer  
Bottom: tool positions 1 – 16 in FINOCNC

## 5.4 Inserting and removing workpieces

On delivery, your FINOCAM A5 processes blanks with a diameter of 98.5 mm.

### 5.4.1 Inserting blanks

You put blanks into the workpiece holder and immobilize them with a fixing disc.

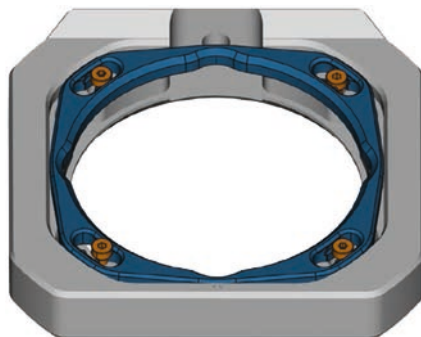
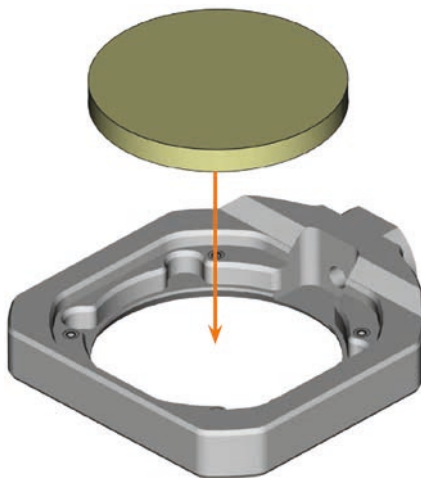


Fig. 22: The fixing disc (blue) is attached to the workpiece holder (grey) with 4 screws (orange)

- M1. Open the front cover.
- M2. Unscrew the 4 screws which attach the fixing disc to the workpiece holder.
- M3. Remove the fixing disc and the blank in the workpiece holder (if any).
- M4. Place the blank into the workpiece holder.



- M5. Place the fixing disc onto the workpiece holder on top of the blank.

M6. Screw down the fixing disc with the screws you unscrewed in step M2.

ⓘ Tighten the screws firmly. If workpieces move or vibrate during processing, the result may become unusable.

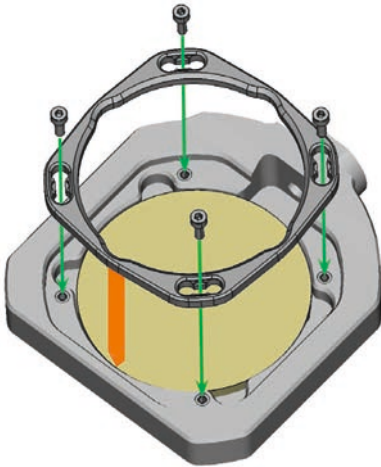


Fig. 24: Attaching the blank with the fixing disc

### 5.4.2 Removing blanks

M To remove a blank, unscrew the 4 screws of the fixing disc and remove the fixing disc and the blank.

### 5.4.3 Mounting the FINOCAM block holder

ⓘ You can obtain the optional FINOCAM block holder via customer service.

The FINOCAM block holder allows you to grind workpieces in block shape with your FINOCAM A5. You can attach the FINOCAM block holder to the built-in workpiece holder and then secure the blocks into the block holder.

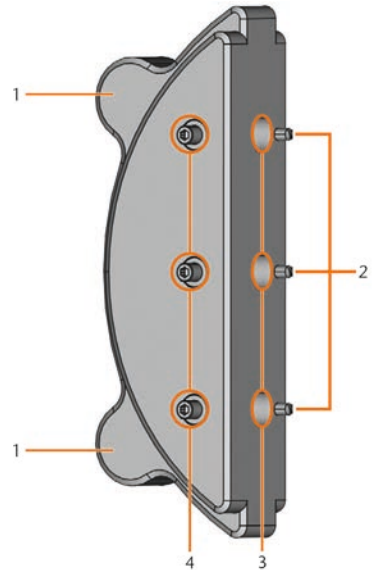


Fig. 24: The FINOCAM block holder for the FINOCAM A5

- 1 Positioning aid for the FINOCAM block holder
- 2 Positioning pins for blocks
- 3 Drilled holes for inserting blocks
- 4 Fixing pins for blocks

M1. Open the front cover.

M2. Remove the fixing disc and blank from the working chamber (⇒ chapter 5.4.1, page 21).

M3. Place the FINOCAM block holder so that the 2 positioning aids (1) lie in the *left* outer roundings of the workpiece holder (⇒ Fig. 25). Hold the FINOCAM block holder in place with one hand.

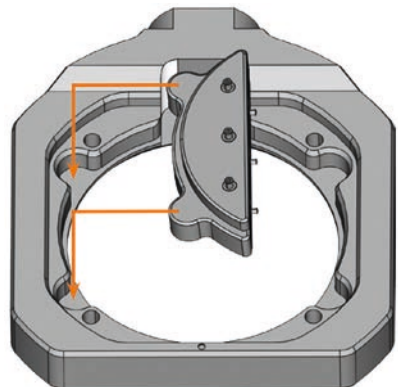


Fig. 25: Positioning the FINOCAM block holder

M4. With the other hand, lay the fixing disc above the FINOCAM block holder into the workpiece holder and screw it down with the provided torque wrench.

➔ The FINOCAM block holder is ready for use.

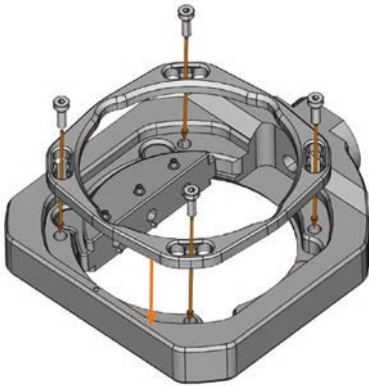


Fig. 26: Immobilizing the FINOCAM block holder with the fixing disc

### 5.4.4 Attaching blocks into the FINOCAM block holder

You can attach up to 3 blocks with round shafts into the FINOCAM block holder.

ⓘ **The material, number and position of the blocks must correspond to the job in DentalCAM.**

M1. Loosen the fixing pins at the position where you want to insert the blocks.

M2. Position the block so that the positioning pin at the FINOCAM block holder lies in the groove in the block shaft.

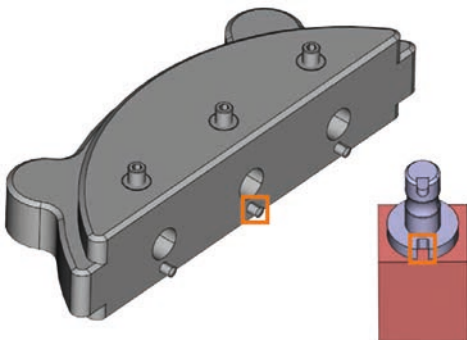


Fig. 27: Positioning pin (left marking) must lie in the groove in the shaft (right marking)

M3. Insert the shaft of the block into the desired position in the FINOCAM block holder until it is completely and firmly seated.

M4. Fixate the block with the corresponding fixing pin. Tighten the pin firmly.

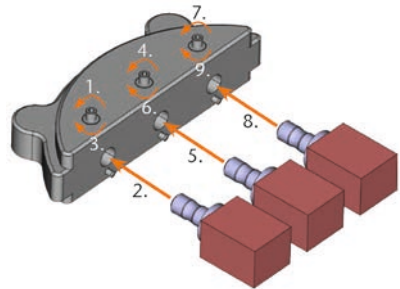


Fig. 28: Inserting blocks into the FINOCAM block holder

## 5.5 Executing jobs

ⓘ **Do not move the machine during job execution, otherwise the results may become imprecise.**

M1. Make sure that the following requirements are met before job execution:

- You created the job that you want to execute in FINOCAM and transferred it to FINOCNC.
- All required tools are assigned to the job in FINOCNC.
- The required tools are in the right positions in the tool changer of the machine.
- All required workpieces of the correct material are inserted.
- The compressed air supply is set correctly.


M2. Close the front cover.

M3. Switch on the suction device and set it to the required level.

S4. Start the job execution in FINOCNC.

➔ The CNC machine begins with the job execution. The working chamber is illuminated in blue.

## 5.6 Interrupting the job execution

S  Click on the depicted icon to interrupt the job execution. The icon only displays during job operation.



## 5.7 Operation interruption or abortion of job execution

An operation interruption can occur because the compressed air supply or the vacuum in the working chamber is not sufficient. An *interrupted* job will normally be resumed automatically after the error is corrected.

The job execution is *aborted* in the following cases:

- In case of a machine malfunction
- In case of a tool breakage
- In case of a power failure

If a job was *aborted*, you have to execute it again in FINOCNC.

### 5.7.1 How to proceed in case of an operation interruption

If the job execution was interrupted, FINOCNC displays a corresponding message.

M1. If FINOCNC prompts that the compressed air is insufficient, check the following:

- The manometer of the service unit
- The installation of the pneumatic hoses
- Your compressor

M2. If FINOCNC prompts that the vacuum in the working chamber is insufficient, check the suction hose and your suction device.

④ You will find additional information in the chapter on troubleshooting (➔ chapter 8).

### 5.7.2 How to proceed in case of a machine malfunction

A machine malfunction is recognized by the internal control unit in case of a critical event. The working chamber will be illuminated in red. FINOCNC displays the error message and error code that was sent by the control unit.

M1. Disconnect the machine from the electrical source and prevent it from being restarted.

M2. Record the error message and error code that is displayed in FINOCNC.

M3. Contact customer service. Have the error message and error code from FINOCNC readily available.

M4. To remove a workpiece from the working chamber, unlock the front cover with the key for emergency release (➔ chapter 5.8).

### 5.7.3 How to proceed in case of a tool breakage

If a tool breaks during machining, the machine will not recognize this immediately and the spindle will continue until the next tool change. Only upon measuring the broken tool will the job execution be cancelled and FINOCNC will display a corresponding message.

A tool breakage can be caused by the following:

- The tool was damaged or worn.
- The tool was put into the wrong tool changer position or was inserted into the spindle manually at the wrong time. As a consequence, it was not suitable for the processing step.
- The distribution of the objects in the workpiece (“nesting”) was not sufficiently adapted to the material.

M1. Open the front cover.

M2. Remove all parts of the broken tool from the working chamber.

M3. If the spindle picked up the tool from the tool changer, check if the tool was inserted into the correct position. Insert a spare tool into the correct position in the tool changer (➔ chapter 5.3).

M4. If you inserted the tool into the collet chuck manually, check if the broken tool corresponds to the initial tool type in which FINOCNC prompted. Have a correct spare tool ready.

M5. Close the front cover and execute the job again.

✦ If tools break regularly, you can find additional information in the chapter on troubleshooting (➔ chapter 8).

## 5.7.4 Procedure in case of a power failure

As long as the machine is not powered, the front cover will remain locked.

- After a short power failure turn on the machine again and follow the on-screen prompts so that the machine can reference.
- In case of a longer power failure use the provided key for the emergency release of the front cover.

## 5.8 Not-Entriegelung der Frontklappe

- Only use the emergency release of the front cover to remove a workpiece from the working chamber if the front cover is permanently locked.

### **WARNING**

#### Crushing hazard and cutting injuries while running the machine with the front cover open

If the safety lock is not reactivated after the emergency release, the user will be able to operate the machine with the front cover open. In this case the front cover will not protect the user from bruises caused by machine movements and from cutting injuries caused by the rotating tool.

- Activate the safety interlock **immediately** after completing your work in the working chamber.
- **Never** operate the machine with the front cover open. h Perform the emergency release only if you are authorised to do so and if you have received training on its usage.
- Store the key for the emergency release in a place where only authorised persons can access it.
- Report **every** emergency release to customer service.

### **CAUTION**

#### Cutting injuries when touching a rotating tool

If a power failure or a machine malfunction occurs during processing, the spindle including the inserted tool keeps rotating. If you touch the rotating tool, you will suffer from cutting injuries.

- Wait until the spindle has stopped rotating before carrying out an emergency release.

There is an opening for the emergency release at the right side of the machine.



Fig. 25: Opening for the emergency release

- M1. Switch off the machine at the main power switch and disconnect the machine from any electrical source and the compressed air supply.
- M2. Remove the protective cap from the emergency release opening (↷ Fig. 26, top).
- M3. Insert the key for the emergency release of the front cover through the opening (↷ Fig. 26, middle).
- M4. Deactivate the safety interlock of the front cover by turning the key counter-clockwise by 90° (↷ Fig. 26, bottom).
  - ➔ You can open the front cover.
- M5. Carry out your work in the working chamber.
- M6. Close the front cover.
- M7. Reactivate the safety interlock of the front cover by turning the key for the emergency release clockwise by 90° (↷ Fig. 26, bottom).
- M8. Check if the front cover actually is locked.
  - ➔ If you can still open the front cover, repeat the steps M6–M8.



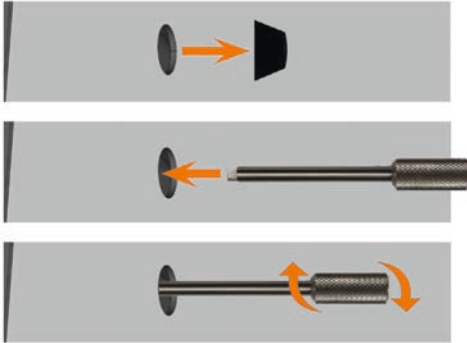


Fig. 26: Using the key for the emergency release  
 Top: Remove cap  
 Middle: Insert key  
 Bottom: Turn the key

M9. Close the opening for the emergency release again with the protective cap.

## 6. Machine maintenance and cleaning




### 6.1 Definition of wear parts

The CNC machine and the extra equipment are warranted for a period of 24 months or 2000 operating hours, whatever comes first. The warranty covers defects in materials or fabrication as long as the regulations for using the machine in all documents are followed.




Of course, the warranty also covers wear parts as long as their failure cannot be attributed to the function-related abrasion. The wear parts that are mentioned below can already wear down within the warranty period due to their normal function. The average useful life of the wear parts can be seen in the following table.

Use these values to determine operating costs, to plan your spare part stock as well as to create individual maintenance and service plans.

## 6.2 Maintenance table

Task	Recommended interval	Procedure/Parts	Spare part illustration
Cleaning the working chamber & the measuring key (⇒ chapter 6.4)	1 x per day, more often if the chamber is very dirty	Vacuum cleaner, brush, dry cloth, <b>never</b> use compressed air	
Cleaning the collet chuck (⇒ chapter 6.5)	1 x per week, in case of rotational imperfections, in case of bad machining results	Spindle service set	
Checking the hoses, cables & connections (⇒ chapter 6.6)	1x per week	Visual inspection	
Cleaning the housing & accessories container (⇒ chapter 6.7)	As necessary	Cloth, water, possibly a mild cleaner	
Service unit: a) Checking for contamination b) Cleaning/exchanging the filter cartridge (⇒ chapter 6.8)	a) <b>Necessarily</b> every day b) In case of visible contamination or every 2 years	A new filter cartridge if necessary	
Exchanging the main fuse (⇒ chapter 6.9)	In case of a defective fuse in the power supply of the machine	Replacement fuse of the type T6,3A L250V	
Calibrating the axes (⇒ chapter 6.10)	Only if necessary	Calibration specimen, micrometre, calibration tool	
Inspection by a service technician (⇒ chapter 6.3)	After 2000 operating hours* or every 2 years*		

## Wear parts

Exchanging wear parts	Average useful life	Procedure/Parts	Spare part illustration
Exchanging the tool changer inserts (⇒ chapter 6.11)	After 500 operating hours*	Replacement inserts, drill for drilling the tool positions, screwdriver	
Exchanging the collet chuck	After 1000 operating hours*		
Exchanging the spindle bearings (requires spindle exchange by service technician)	After 2000 operating hours* or every 2 years*	Performed by service technician	

\* These are recommendation guidelines. Depending on the processing material and how well the machine is cleaned, these values may differ.

### 6.3 Inspection

We recommend having a service technician perform an inspection regularly.

- In addition, have an inspection carried out whenever the machine is being repaired.

### 6.4 Cleaning the working chamber and measuring key

**CAUTION**

#### Breathing difficulties caused by processing dust

Processing dust that gets into your lungs can cause breathing difficulties.


- Clean the machine only if the air extraction system is properly installed and activated.
- Wear a face mask of class FFP2 during the entire cleaning.


**NOTICE**

#### Damaging of the linear guides or the spindle when cleaning with compressed air

If you clean the working chamber with compressed air, material chips can reach the linear guides or the spindle bearings.

- Clean the interior of the machine **exclusively** with a vacuum cleaner, a brush and a cloth and **never** with compressed air.

- M1. Have ready:
- A vacuum cleaner
  - A *dry* cloth
  - A *mild* cleaner (optional)
  - A wet brush
- M2. Switch on the machine and start FINOCNC.
- S3.  In the upper icon bar, click on the depicted icon.

- S4.  Move the spindle to the cleaning position by clicking on the depicted icon.

➔ The spindle will move to the cleaning position and the sealing air will be activated.

- M5. Open the front cover.
- M6. Suck up the coarse dirt in the working chamber with the vacuum cleaner.
- M7. Clean the whole interior thoroughly with the dry cloth. Use a mild cleaner if necessary.

- M8. Thoroughly clean the workpiece holder including all screws, pins and clamping mechanisms as well as all openings from the processing dust.

- M9. Clean the measuring key with a brush.

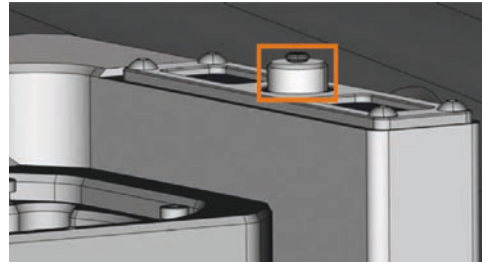



Fig. 27: Measuring key on top of the tool changer (marked orange)

- M10. Close the front cover of the machine.
- S11.  Move the spindle from the cleaning position back to the default position by clicking the depicted icon.

### 6.5 Cleaning the collet chuck

**NOTICE**

#### Damaging of the spindle when cleaning with compressed air

If you clean the collet chuck with compressed air, the spindle bearings may get damaged.

- Clean the collet chuck **exclusively** with the appropriate service set.

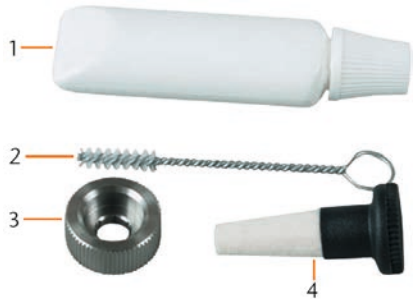


Fig. 28: Components of the spindle service set

- 1 Collet grease
- 2 Cleaning brush
- 3 Knurled nut
- 4 Cleaning cone

- M1. Close the front cover of the machine.  
 S2. Open the collet chuck with the “Release tool” function of FINOCNC and remove the tool from the spindle if necessary.  
 M3. Insert the measuring pin into the collet chuck and keep holding it with one hand. With the other hand put the knurled nut to the spindle.

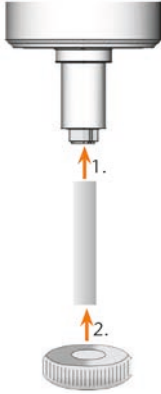


Fig. 29: Unscrewing the collet chuck

- M4. Loosen the collet chuck with the knurled nut and unscrew the collet chuck with your hand or with the knurled nut.  
 M5. Remove the measuring pin from the collet chuck. Then put it aside within reach together with the knurled nut.  
 M6. Clean the inner cone of the spindle with the cleaning cone of the service set.



Fig. 30: Cleaning the inner cone of the spindle

- M7. Clean the collet chuck with the brush of the service set. Make sure that the 3 buffers in the collet chuck do not fall out during cleaning.



Fig. 31: Cleaning the collet chuck

- 1 Longitudinal slot
- 2 Buffer
- 3 Cleaning brush

### NOTICE

#### Damaging of the spindle when using the wrong grease or applying the grease in a wrong way

If you use grease that is unsuitable for the spindle or if grease gets into the longitudinal slots of the collet chuck, the spindle may get damaged.

- Ensure that no grease gets into the longitudinal slots of the collet chuck.
  - Only use a very small, about pinhead-size amount of the grease.
  - Only use the provided collet grease of the service set.
- M8. Put a small amount of the collet grease on the index finger and smear it with the thumb.  
 M9. Apply the smeared collet grease to the flanks of the collet chuck.

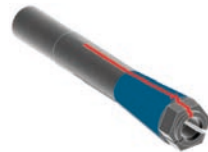


Fig. 32: Greasing the collet chuck; surface to grease is marked in blue; Slot that may not be greased is marked in red

- M10. Insert the measuring pin into the collet chuck with one hand and keep holding it. Screw the collet chuck with the knurled nut in your other hand *tightly* into the spindle.

- Ⓢ In any case, turn the knurled nut up to the stop so that the collet chuck is properly seated in the spindle. Otherwise rotational imperfections can occur during operation which will worsen your processing results.

- M11. Remove the measuring pin from the collet chuck and store it together with the other components of the spindle service set.
- M12. Close the front cover.

### 6.6 Checking the hoses, cables and connections

- M1. Disconnect the machine from the electrical source and the compressed air supply.
- M2. Check the hoses and cables that are connected to the machine.
- M3. In case of damages prevent the machine from being restarted. Replace the damaged cables and hoses immediately with original replacement cables. Contact customer service.
- M4. Verify all connections on the connection panel (e.g. loose connections).
- M5. Re-insert loose cables and hoses tightly into the corresponding connections. In case of damaged connections cease use of the machine immediately. Contact customer service.

### 6.7 Cleaning the housing

**NOTICE**

#### Damaging of the housing when using a nonrecommended cleaner

If you use an unsuitable cleaner for cleaning the machine housing, the surface or the adhesive foil can get damaged.

- Avoid contact of the powder coating with alkaline or acid substances. Especially metallic powders show a highly sensitive reaction.
  - Take care of the glued symbols so that they do not peel off. The adhesive foil is especially sensitive to rubbing and strong detergents.
  - If the usage of a special cleaner is necessary to eliminate certain dirt, we recommend checking the suitability of the cleaner at a hidden place of the part first.
- M1. First, clean the powder coated surface with a soft, dry cloth.
  - M2. If some dirt cannot be removed this way, moisten the cloth. Use a pH neutral cleaner if necessary.

### 6.8 Checking the service unit

**NOTICE**

#### Damaging of the machine when compressed air is contaminated

Compressed air that does not fulfil the guidelines for purity according to ISO 8573-1 can damage the machine.

- Check the water separator of the service unit daily for contamination.
- Never use the machine if there is water, oil or solid particles in the water separator.

#### 6.8.1 Checking the water separator for condensate

Condensate in the separator usually points to compressed air not being dry enough.

- M1. Check if water, oil or solid particles piled up in the water separator.
  - ➔ In this case switch the machine off immediately and proceed as follows:
- M2. Check the compressed air supply and make sure that the compressed air fulfils the requirements for air purity according to ISO 8573-1. Do not use the machine until the compressed air fulfils this requirement!
- M3. Drain the water separator by turning the discharging screw counter-clockwise.
  - ➔ The condensate is blown out downwards under pressure.
- M4. Close the discharging screw again by turning it clockwise.

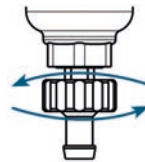


Fig. 33: Opening/closing the discharging screw at the service unit

## 6.8.2 Exchanging/cleaning the contaminated filter cartridge

You have to clean or exchange the filter cartridge in the water separator in case of strong contamination.

① A strongly contaminated cartridge can lead to a pressure loss.

If the compressed air fulfils the requirements for air purity according to ISO 8573-1, the filter cartridge usually does not have to be changed.

➤ If the filter cartridge is contaminated, check the purity of your compressed air.

### You exchange or clean the filter cartridge as follows:

M1. Disconnect the machine from the compressed air supply.

M2. Unscrew the bowl of the water separator.

M3. Untighten the filter screw below the filter cartridge.

M4. Pull out the filter cartridge and clean it if necessary.

① A new filter cartridge is available as spare part from customer service.

M5. Insert the new or cleaned filter cartridge and reassemble the water separator.

## 6.9 Exchanging the main fuse

① Only use fuse type T6,3A L250V as a replacement fuse.

The internal power supply of the FINOCAM A5 has a main fuse that is accessible from the outside and can be replaced if necessary.

① A new main fuse is available as spare part from customer service.

M1. Turn off the machine at the main power switch and disconnect the machine from any electrical source and the compressed air supply.

M2. Remove the power cord from the connection panel.

M3. Remove the cover of the fuse.



Fig. 34: Cover of the fuse (marked orange)

M4. Remove the defective fuse and replace it with a new fuse of the type T6,3A L250V.

If you do not have a replacement fuse ready, take the replacement fuse from the right side of the fuse cover and put it into the left side of the fuse cover.

M5. Remount the fuse cover.

## 6.10 Calibrating the axes

### NOTICE

### Deterioration of machining results caused by an incorrect calibration

The machine is already calibrated at delivery. As long as your machining results are without flaw, a new calibration is not necessary. A calibration takes much time and can deteriorate the machining results in the worst case if it is not done correctly.

➤ In case of inaccurate machining results, try adjusting the working conditions first: check the fixation of the workpiece, the state of the tool or of the processing material.

➤ Before calibrating the machine, contact customer service.

➤ Be very careful when measuring and entering data during calibration. When in doubt, stop the calibration.

With test and calibration specimens you can measure and, if possible, improve the machining results of the CNC machine

① The documentation for the manufacturing software contains all information on calibrating the machine. Therefore, you will only find information specific to the FINOCAM A5 in this document.

Your FINOCAM A5 is delivered with a calibration set. It contains the following parts:

- Calibration blanks which you use to mill calibration and test specimens
- A tool for milling the calibration or test specimens
- A micrometre for measuring the machining precision

**NOTICE**

**Tool breakage or incorrect results caused by loose screws**

If the workpiece is screwed into the workpiece holder too loosely, the measurement results may become incorrect or the tool may break during calibration.

- Tighten the screws of the fixing disc firmly.
- M1. Insert a calibration blank into the workpiece holder.
- S2. Mill the calibration/test specimen as described in the documentation for the manufacturing software.
- ➔ After milling the calibration/test specimen looks as follows:

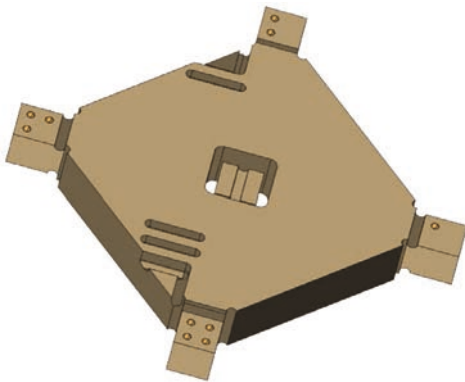


Fig. 35: A milled calibration/test specimen for the FINOCAM A5

- M3. Remove the calibration/test specimen from the machine.
- S4. Follow the instructions on calibration in the documentation for the manufacturing software.
- M5. After the calibration, remove the calibration tool from the machine and keep all parts of the calibration set for further use.

**6.11 Replacing the tool changer inserts**

When the tool changer inserts are worn, they should be replaced. Afterwards you must drill the tool positions into the new inserts with the CNC machine.

- Your CNC machine comes with tool changer inserts as spare parts and with the drill tool.
- Additional inserts and drill tools are available via customer service.

- Always replace *both* inserts together even if only one of the inserts is worn. The machine will always drill the tool positions for *both* inserts.
- ① The documentation for the manufacturing software contains step-by-step instructions for drilling the inserts. Below you find a description of how to replace the tool changer inserts in the machine.
- M1. Have 2 tool changer inserts ready as spare parts.
- M2. Open the front cover.
- M3. Remove all tools from the tool changer.
- M4. Loosen the 4 screws on the upper side of the tool changer and lift the cover (➔ Fig. 36).
- M5. Remove the 2 existing tool changer inserts and replace them with 2 new ones (➔ Fig. 37).
- M6. Put the cover back onto the tool changer and screw it down with the screws that you untightened in step M4.
- S7. Follow the instructions in the documentation for the manufacturing software and drill the tool positions in the new inserts.

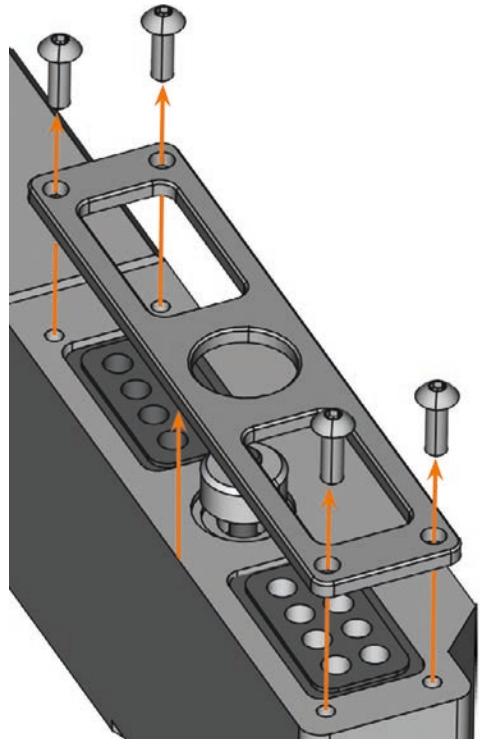


Fig. 36: Loosening the screws and lifting the cover

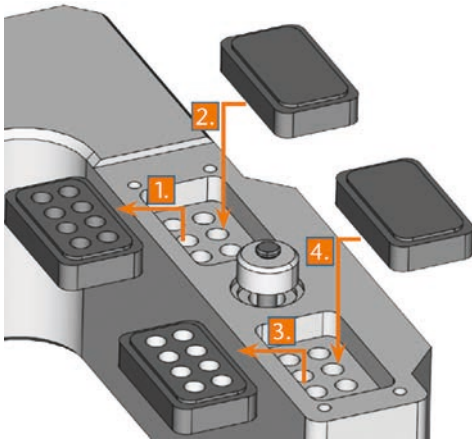


Fig. 37: New tool changer inserts (right, without drill positions) replace old inserts (left, with drill positions)

## 7. Disposal

We will dispose of the machine at no cost. The owner will bear the costs for disassembly, packaging and transport.

- Before sending in the machine for disposal, contact customer service.
- If you dispose the machine yourself, abide by the national and local laws of the disposal location.

## 8. Troubleshooting

### **⚠ DANGER**

#### **Danger to life due to improper troubleshooting**

In case of improper troubleshooting, you may suffer from severe or deadly injuries caused by, for example, electric shocks, axis and spindle movements, loose pneumatic components and pneumatic hoses. In addition, your machine may get damaged.

- Do not remove the housing of the machine.
- **Before** you check or run pneumatic hoses, close the external compressed air supply valve.
- **Before** you check or run electric cables or power connectors, disconnect the machine from the electrical source and prevent it from being restarted.
- Do not perform any troubleshooting while the machine is operating.
- Wear safety gloves throughout the troubleshooting process.

- If you are unsure of how to perform certain steps during troubleshooting or cannot solve the problems, abort the troubleshooting and contact customer service.

### Additional symbols in this chapter

❓ Problem/question

💬 Solution/answer

### Frequently Asked Questions (FAQ)

❓ **The suction hose of my suction device does not fit into the opening for the air extraction system of the CNC machine.**

💬 Is the suction hose equipped with a hose connection?

M1. Unscrew the hose connection from the suction hose.

M2. Try to insert the suction hose into the opening for the air extraction system.

M3. If the suction hose still does not fit, contact customer service and obtain a suitable hose connection.

M4. Install the suitable hose connection to the suction hose.

➤ Chapter 4.5.3

💬 Did the suction hose come without a hose connection?

M1. Contact customer service and obtain a suitable hose connection.

M2. Install the suitable hose connection to the suction hose.

➤ Chapter 4.5.3

❓ **I cannot open the front cover.**

💬 Is the machine operating? While the axes are moving, the front cover stays locked.

M Wait until the machine has finished and the working chamber lighting shines green.

ⓘ **Without electricity, the front cover remains locked.**

💬 Has a power failure occurred at the installation site of the machine?

M Depending on the duration of the power failure, restart the machine or use the key for the emergency release.

➤ Chapter 5.7.4



🗨️ Is electricity available at the installation site of the machine?

- M1. If you have not removed the transport lock from the working chamber yet, disconnect the machine from the manufacturing computer.
  - M2. Connect the machine to the electrical source and switch it on via the main power switch.
  - M3. If the working chamber lighting does not illuminate, check if the power cable is properly seated in machine and to the power source.
  - M4. Try connecting the machine to a different socket.
- ➔ Chapter 3.2

**❓ I have installed all components, started FINOCNC but the machine does not reference.**

🗨️ Is the front cover open? The machine does not reference with the front cover open.

M Close the front cover.

🗨️ Is the USB cable connected properly?

M Check if the USB cable is properly seated in the connector and is undamaged. If possible, use the provided cable.

🗨️ Is the correct port specified in FINOCNC? Without the correct port, the application will not establish a connection with the machine.

- S1. Start FINOCNC.
- S2. Try to have the application determine the correct port in the application settings.
- S3. If the application cannot determine the correct port, enter the port manually. For this, follow the instructions in the documentation for the manufacturing software.

➔ Chapter 4.8

**❓ My machine does not execute any jobs although FINOCNC displays that there is a connection between the manufacturing computer and the machine.**

🗨️ Is the front cover open? The machine does not move the axes if the front cover is open.

M Close the front cover.

➔ Chapter 3.2

**❓ The machining results are not satisfactory and/or tools keep breaking.**

🗨️ Do the tool positions in FINOCNC correspond to the tools in the tool changer of the machine? If not, the machine uses the wrong tools during job execution.

- S1. Call up the job execution view in FINOCNC.
- S2. Compare the tool positions in the application to the tools in the tool changer.
- M3. Replace the wrong tools in the tool changer with the correct ones.

➔ Chapter 5.3

🗨️ Is the workpiece attached properly?

M Ensure that all screws, pins and clamping mechanisms fixate the workpiece firmly.

➔ Chapter 5.4

🗨️ Are the tool changer inserts worn?

M Exchange the tool changer inserts against new ones.

➔ Chapter 6.11

🗨️ Are screws, pins and clamping mechanisms as well as the corresponding openings contaminated by processing dust?

M Clean the mentioned components thoroughly.

➔ Chapter 6.4

🗨️ Are the tools worn?

M Check the tools in the tool changer and exchange the worn tools with new ones. Also check the tool life values which are shown in FINOCNC.

🗨️ Do rings on the tools sit in the groove on the tool shank?

M Check all tools and push rings that have moved into the groove again.

🗨️ Do the parameters of the job in FINOCAM correspond to the parameters of the workpiece?

M Make sure that the following parameters of the job and of the workpiece correspond to each other and that they are suitable for the objects that you want to machine:

- Material type
- Dimensions of the workpiece
- Indications (types) of the individual objects

Do you use the newest version of the manufacturing software that is released for the FINOCAM A5?

New versions often contain important optimizations.

S Update the applications by clicking on the depicted icon.



Alternatively, contact customer service.

Are the STL files of sufficient quality?

S1. Before you import STL files into the manufacturing software, check their quality. Especially consider the manufacturer information on wall thickness and border thickness.

S2. If necessary, adjust the settings of your scanner and scan application.

Are the bars of the individual objects set correctly?

S If you set bars, consider the corresponding information in the documentation for FINOCAM.

Is the measuring key contaminated? This prevents a correct tool measurement.

M Clean the measuring key with a brush.

Chapter 6.4

Is the collet chuck of the spindle contaminated or is it loosely seated in the spindle?

M1. Clean the collet chuck with the provided spindle service set.

M2. When you insert the collet chuck into the spindle, make sure that it is properly seated.

Chapter 6.5

Did you calibrate the machine shortly before the problems occurred or have there been any problems recently with the tool change?

M Contact customer service.

Did you exchange the collet chuck at the recommended interval?

M Verify the recommended interval for exchanging the collet chuck in the maintenance table and exchange the collet chuck if necessary.

Chapter 6.2

**FINOCNC interrupts the job execution and displays that the air pressure is too low.**

You can resolve this problem while the job execution is interrupted. FINOCNC continues the job as soon as the air pressure is sufficient again.

Is the service unit properly set?

M Set the air pressure at the service unit to a value between 6 bar and 8 bar (recommended: 7 bar).

Chapter 4.4.4

Is the error caused by the external compressed air supply?

M1. Close the external compressed air supply valve.

M2. Check if all pneumatic hoses are properly seated in their connections and are undamaged.

M3. Check if your compressor is switched on and set correctly.

M4. Check if all effected valves of your compressed air system are open.

Does the air pressure fluctuate significantly according to the service unit so that the job execution is interrupted and continued frequently?

M1. Check if your compressor can permanently generate at least 6 bar air pressure with a volume flow of 40 l/min.

Not every compressor is designed for commercial use with dental machines.

M2. If necessary, replace your compressor with one that meets the above recommendations.

Chapter 4.4

**FINOCNC interrupts the job execution and displays that the vacuum is too low.**

You can resolve this problem while the job execution is interrupted. FINOCNC continues the job as soon as the vacuum is sufficient again.


Is the suction device switched on and operating?

M1. Switch on the suction device.


M2. Check if the suction hose is properly seated in the opening at the machine and is undamaged.

M3. If the machine controls the suction device, check if the switching unit is properly installed. Try operating the suction device without the switching unit.


Chapter 4.5

-  Is the suction device set correctly?

M Set the extraction level higher until FINOCNC continues the job.


⇒ Chapter 4.5
-  Is the filter or container of the suction device full?


M If necessary, insert an empty filter into the suction device or empty the container.

⇒ Documentation of the suction device
-  Does the suction device have an automatic tapping function?

M Choose a shorter tapping interval.

⇒ Documentation of the suction device

 **I have exchanged the tool changer inserts and now there are no holes for the tools anymore.**

-  Tool changer inserts are delivered without drilled holes for tools. You drill them with the CNC machine.

S Drill the tool positions into the inserts with FINOCNC.

⇒ Chapter 6.1f

## 9. Index

### A

Air extraction system .....	8, 14
Air purity .....	13
Axis calibration .....	28

### B

Blanks, insert/remove .....	20
-----------------------------	----

### C

Calibration .....	28
Cleaning .....	6, 23
Collet chuck	
clean .....	25
Colours of working chamber lighting.....	7
Compressed air	
check .....	17
consumption .....	13
install .....	13
requirements .....	13
set via service unit .....	14
Condensate.....	27

### D

Discharging screw.....	27
Disposal .....	30

### E

Emergency release of the front cover.....	22
---	----

### F

FAQ .....	30
Filter cartridge .....	28
Flow rate, check .....	32
Front cover emergency release .....	22
Fuse, exchange .....	28

### H

Hose connection.....	15
Housing, cleaning .....	27

### I

Inspection.....	25
Installation site .....	11
Installing the machine .....	11
Intended use.....	5

### J

Job execution, start .....	21
----------------------------	----

### K

Key for emergency release .....	22
---------------------------------	----

### M

Machine malfunction .....	22
Main fuse, exchange .....	28
Maintenance.....	6, 23
table .....	24
Manufacturing software .....	9
Measuring key .....	25

### O

Operation .....	21
Operation interruption .....	21

### P

Power failure .....	22
Processing, start .....	21

### R

Regulations .....	5
Room temperature.....	11
Rotational axes.....	28

### S

Safety instructions .....	3
Safety interlock .....	22
Scope of delivery .....	11
Service unit	
check .....	27
install pneumatic hoses .....	14
mount to the CNC machine .....	13
overview .....	13
set air pressure .....	14
Sound emission.....	9

Spindle.....6, 9  
 Spindle service set.....25  
 Storage.....8  
 Suction device  
     data cable.....15  
     hose connection .....15  
     installation .....15  
     requirements.....15  
     switching unit.....16  
 Switching unit .....16

**T**

Technical data.....9  
 Testing the machine .....17  
 Tool breakage.....22  
 Tool changer .....9, 19  
 Tool changer positions .....19  
 Tools, insert/exchange .....19  
 Transport.....6  
 Troubleshooting.....30

**V**

Vacuum, check.....17

**W**

Warranty.....24  
 Water separator.....27  
 Working chamber  
     cleaning.....25  
     lighting.....7

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Original FINO  
Germany

# FINOCAM 5 + FINOCNC

Instructions for use



FINO · der feine Unterschied · the fine difference · la fine différence · la fina diferencia · la fine differenza

Gebrauchsinformation · User Information · Mode d'emploi  
Información sobre el uso · Informazioni d'uso  
Gebruiksaanwijzing · Instrukcja stosowania

# CONTENTS

<b>1. About these instructions for use</b>	<b>4</b>
<b>2. User interface elements</b>	<b>5</b>
<b>3. Installation &amp; update</b>	<b>7</b>
<ul style="list-style-type: none"><li>• Checking the system requirements • Preparing the Installation / update</li><li>• Starting the installation / update • Using the update feature • Viewing the release notes</li></ul>	
<b>FINOCAM</b>	
<b>4 Introduction</b>	<b>15</b>
<ul style="list-style-type: none"><li>• The concept of FINOCAM • Intended use</li></ul>	
<b>5. The user interface</b>	<b>16</b>
<b>6. Starting and setting up FINOCAM</b>	<b>17</b>
<ul style="list-style-type: none"><li>• Adjusting the general settings • Specifying the processing settings</li><li>• Specifying the data transfer settings</li></ul>	
<b>7. Creating workpieces and selecting them for editing</b>	<b>23</b>
<ul style="list-style-type: none"><li>• Creating a new workpiece • Selecting a workpiece from the archive</li><li>• Deleting a workpiece from the archive</li></ul>	
<b>8. Importing STL files</b>	<b>26</b>
<ul style="list-style-type: none"><li>• Selecting an STL file via the file browser • Importing STL files via a root directory</li><li>• Activating or deactivating the STL file preview • Moving objects vertically within the workpiece</li><li>• Placing sinter bars or sinter plates • Selecting the type of an object</li><li>• Specifying the processing quality (precision) • Specifying the 5-axis release of an object</li><li>• Specifying the import options • The import list</li></ul>	
<b>9. The nesting view: Placing objects in the workpiece</b>	<b>35</b>
<ul style="list-style-type: none"><li>• Moving and rotating objects • Special requirements when placing objects in grinding blocks</li><li>• Specifying the processing status of objects • Removing objects from jobs</li></ul>	
<b>10. Setting bars and drops</b>	<b>39</b>
<ul style="list-style-type: none"><li>• Setting bars • Changing the finishing type of bars • Moving bars vertically</li><li>• Moving bars horizontally • Important information on setting bars • Removing bars</li><li>• Settings drops • Removing drops</li></ul>	



<b>11. Editing empty spaces</b>	<b>44</b>
<ul style="list-style-type: none"> <li>• Unlocking empty areas • Locking empty areas</li> </ul>	
<b>12. Calculating jobs</b>	<b>45</b>
<ul style="list-style-type: none"> <li>• Calculating individual jobs • Calculating multiple jobs in succession</li> <li>• Error messages when calculation job data</li> </ul>	
<b>FINOCNC</b>	
<b>13. Introduction</b>	<b>50</b>
<ul style="list-style-type: none"> <li>• The concept of FINOCNC • Intended use</li> </ul>	
<b>14. The user interface</b>	<b>71</b>
<b>15. Starting and configuring FINOCNC</b>	<b>72</b>
<ul style="list-style-type: none"> <li>• Specifying the application settings • Configuring tool types • Information about tool types</li> <li>• Viewing tool data • Specifying the tool life • Activating the press down function for tools</li> <li>• Configuring the manual tool change • Unlocking a wet grinding module for the CNC machine</li> </ul>	
<b>16. Defining your tool stock and tool magazines</b>	<b>82</b>
<ul style="list-style-type: none"> <li>• Tool cards • Editing the tool stock • Editing tool magazines • Resetting the remaining tool life</li> </ul>	
<b>17. Executing jobs</b>	<b>63</b>
<ul style="list-style-type: none"> <li>• Job execution for machines without blank changer</li> <li>• Job execution for machines with blank changer</li> <li>• Equipping the blank changer &amp; assigning jobs • Equipping the tool changer via the spindle</li> <li>• Changing tools manually during job execution • Deleting jobs</li> </ul>	
<b>18. Controlling individual machine functions</b>	<b>76</b>
<b>19. Maintaining the CNC machine</b>	<b>80</b>
<ul style="list-style-type: none"> <li>• Milling calibration and test specimens • Drilling tool positions</li> <li>• Updating the firmware of the CNC machine</li> </ul>	
<b>20. Retrieving application and machine data</b>	<b>86</b>
<ul style="list-style-type: none"> <li>• Viewing the job log and restoring jobs • Retrieving and exporting the machine geometry</li> <li>• Retrieving the operating hours of the spindle • Retrieving dongle data</li> </ul>	
<b>21. Index</b>	<b>89</b>

# 1 About these instructions for use

## 1.1 Used symbols

### Instructions

- ★ Prerequisite for acting successfully
- General instruction
- M Specific manual action
- S Specific action in the software
- ➔ Result

### Additional symbols

- Lists
- ⓘ [Additional information](#)
- ↪ Cross reference

**IMPORTANT**

Important instructions without any danger for people or objects

**HINT**

Information to make work easier or more efficient

## 1.2 Structure of safety notes

 **SIGNAL WORD**

### Type and source of hazard

Further explanations and consequences when ignoring the hazard

- Instructions to avoid the hazard

The following signal words may occur in these instructions:

 **DANGER**

**DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING**

**WARNING** indicates a hazardous situation which, if not avoided, can result in death or serious injury.

 **CAUTION**

**CAUTION** indicates a hazardous situation which, if not avoided, can result in minor or moderate injury.

**NOTICE**

**NOTICE** indicates a situation which can lead to material damage of the product or in the environment of the product.

## 1.3 Using the instructions for use

The instructions for use aim for the following:

- They inform you about the intended use of the respective software so that you can work safely and always accomplish high quality work results.
- They inform you about possible source of hazards that may result from the system.
- Read the instructions for use carefully.
- Make sure that every user can access these instructions.
- Follow the safety notes and safeguards in the operating instructions for the used CNC machine(s) under all circumstances.

**User interface text**

You can recognize quotations of user interface text by the narrow font printed in bold. **Example:** The program displays **Workpiece not defined.**

**Keys**

Keys you need to press are printed within arrow brackets (<>). If you have to press multiple keys at the same time, all affected keys are printed within the same brackets and are connected by a plus sign (+). Do *not* enter this plus sign.

**Example:** Press the <WINDOWS-KEY + I>.

**2 User interface elements**

You control the applications with the following control elements in the views and windows:

**Drop-down lists**



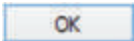
When you click on the depicted arrow icon, a selection list opens. Select the desired entry from the list by clicking on it. If the available space is not sufficient to show all entries, use the scroll bar at the side of the list to display the remaining entries.

**Icons**



By clicking on an icon you call up a function or confirm a program message. When you click on an icon with the right mouse button, the applications show a short text about the corresponding function in the info area.

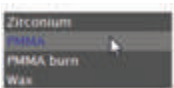
**Buttons**



By clicking on a button you call up a function or confirm a program message. In contrary to icons, buttons contain text instead of an image. In these instructions fore use the text is contained within square brackets ([ ]).

**Example:** Click on [Next].

**Selection lists**



In a selection list you mark the desired entry in grey by clicking on it. If the available space is not sufficient to show all entries, use the scroll bar at the side of the list to display the remaining entries.

**Input fields**



In an input field you enter characters via your keyboard. Click on the desired field and type in the text.

**Text fields**

Text fields only show text. You cannot enter text into them.

### Radio buttons



Through radio buttons you select exactly one from multiple available options. Within a group of radio buttons only one button can be activated. To activate a radio button, click on it. The radio button that was previously activated will automatically be deactivated.

### Check boxes/Check fields



Through a check box/check field you activate or deactivate the corresponding setting. Click on a check box / check field, to toggle between the activated and deactivated state. In contrast to radio buttons, you can toggle check boxes / check fields individually. The left image shows a check box, the right image shows a check field.

### Value bars



A value bar visualizes the current state of the corresponding value. You can adjust the bar via the following means:

- You click on the spot where you want the value bar to end. The length of the value bar and with it the corresponding value change accordingly.
- You press and hold the left mouse button and “drag” the end of the value bar until the desired value is reached. Then you release the mouse button.

### Window for file selection

In some places of the applications you can import files. For this the window for file selection may be used:

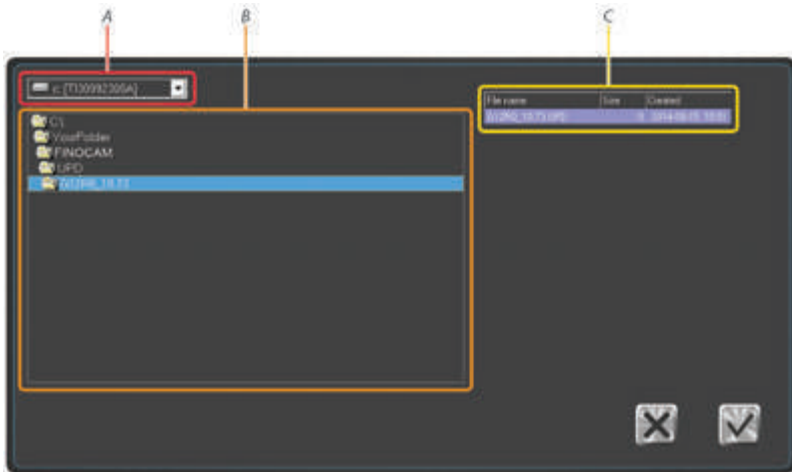


Illustration 1: Window for file selection with marked areas

A: Storage devices

B: Folder list

C: File list

- S 1.** In the drop-down list with storage devices [A] select the device which contains the file you want to import.
  - ➔ The application updates the list with folders [B] and displays the folders on the selected storage device.
- S 2.** To open a folder, double click on its name in the list [B].
  - ➔ In the list with files [C] the application displays the files in the selected folder that you can import.  
If there are no importable files in the folder, the file list remains empty. Which files you can import depends on the context in which you opened the window for file selection. For further information see the corresponding passages in these instructions for use.
- S 3.** Mark the file you want to import in the file list [C].
- S 4.** Click on the depicted icon.
  - ➔ **a)** The window for file selection closes.
  - b)** The program imports the selected file.



**The info area**

The info area is located at the bottom of the FINOCAM and FINOCNC window. In this area the applications show help texts and general messages.



Illustration 2: The info area at the bottom of the Windows (marked in red)

**Cancelling processes**

To keep the texts in these instructions for use as short as possible, we only describe how to complete processes successfully. However, in many places you can also cancel the process.



- S** To cancel a process, click on the depicted icon.
  - ➔ The application cancels the current process and closes the corresponding window.

**3 Installation & update**

You install and update FINOCAM and FINOCNC together via one setup program.

**Incorrect job execution and damaging of the CNC machine if the program version is outdated and/or incompatible**

If you use FINOCAM and/or FINOCNC versions that are outdated or incompatible to your CNC machine, jobs may be executed incorrectly or the machine may be damaged due to an incorrect machine control.

- Only install the newest FINOCAM and FINOCNC version that is released for your CNC machine.
- Always update FINOCAM and FINOCNC to the newest version that is released for your CNC machine.

**NOTICE**

### 3.1 Checking the system requirements

Make sure that your system meets the following requirements:

- Operating system: 64 bit version of Windows 7 or Windows Vista or Windows 8
- Free hard drive space: ca. 500 Megabyte
- Working memory: 2 Gigabyte
- Vertical screen resolution: 800 pixel

### 3.2 Preparing the Installation/update

#### IMPORTANT

- S 1.** Deactivate all energy saver settings of your computer and, if using a mobile computer, establish a permanent connection to the power source. Keep this configuration also during operation because otherwise the job calculation can be interrupted.
- S 2.** Plug the provided dongle into a free USB port of your computer. Only with a dongle can FINOCAM and FINOCNC be run and installed.
- S 3.** Have the newest installation data ready. You receive them from your reseller.
  - ① You receive the installation data in a ZIP file. This file contains all necessary data which you have to copy from the ZIP file before the installation.
- S 4.** Open the ZIP file and copy the data into a folder.
- S 5.** Deactivate your anti virus software *during the installation or update*. An activated anti virus software can prevent the installation or update.

### 3.3 Starting the installation/update

For a new install of FINOCAM and FINOCNC on a computer, you always use the setup program as described in this chapter.

If you want to update FINOCAM and FINOCNC, you have two choices:

- **Using the setup program**

If you received a new version as a ZIP file. Follow the instructions in this chapter.

- **Using the update feature**

FINOCNC can automatically update itself and FINOCAM through the internet. We recommend using this feature. Read the description further below (⇒ page 13).

#### **Installation / update via the setup program**

FINOCAM and FINOCNC come with multiple components. The following table shows which components you have to install during a new installation or update and how you start the installation for each component.

#### IMPORTANT

You always have to start the setup program manually (⇒ Kapitel 3.3.1). This is presupposed in the following table.

Component	How to start the Installation	Necessary when installing?	Necessary when updating?
FINOCAM / FINOCNC core application	Automatically via the setup program	yes	yes
USB driver	User choice in the setup program	yes	no
STL viewer	User choice in the setup program	no	no
Runtime environment for C++	Manually via a separate setup program	yes	Only when a new version of the run time environment is available

When updating, you can also install the non-necessary components if technical circumstances require it.

### 3.3.1 Installing or updating the core applications

★ You have prepared the installation (➔ page 8).

**S 1.** Start the **Setup.exe** file in the folder with the installation data.

**S 2.** If windows asks you whether Setup.exe may make changes to your computer, click on **[Yes]**.

➔ The setup window opens.

#### Configuring a new installation

**S 1.** Activate the New radio button.

➔ In the bottom area of the window the setup programs displays a list of languages.

**S 2.** Activate the Create Desktop-Icon check field. Otherwise you can only start the applications through the executable files in the installation folder.

**S 3.** Activate the **Install USB-Driver** check field. Without the USB driver the connection to your CNC machine will not work.

**S 4.** If you want to view STL files on the computer, and there is no application installed for this, activate the **Install STL viewer** check field. The viewer is not necessary for working with FINOCAM and FINOCNC.

① [Use the STL viewer, for example, to check the strength of walls, the diameter of drillings etc.](#)

**S 5.** If you want to change the standard installation folder, enter the desired folder name in the **Destination folder** input field.

**S 6.** In the **Language** selection list, mark the desired language for the user interface. You can change this setting in the application settings later on (➔ page 17, page 52).

**S 7.** Click on the depicted icon in the bottom right corner of the window.



➔ The installation wizard for the FINOCAM and FINOCNC core applications starts up.

**S 8.** In the first and the second window of the installation wizard click on **[Next >]**.

**S 9.** In the third window of the installation wizard click on **[Finish]**.

## IMPORTANT

- ➔ The installation wizard closes. Afterwards, the setup programs of the components that you chose to install in the main setup program will start up.
- When performing a new installation, you should configure both applications after all components have been installed. Otherwise FINOCNC, for example, cannot connect to your CNC machine. You find information on configuring the applications elsewhere:

- FINOCAM: page 17
- FINOCNC: page 51

### Configuring an update

- S 1.** Activate the **Update** radio button.
  - S 2.** Only if required, activate the check fields for the desktop icon, the USB driver and the STL viewer.
  - S 3.** Do not change the text in the **Destination folder** input field. Otherwise the setup program will create all FINOCAM and FINOCNC files again instead of updating the existing ones.
  - S 4.** Click on the depicted icon in the bottom right corner of the window.
- ➔ The setup program updates FINOCAM and FINOCNC. Afterwards the setup programs of the components that you chose to (re-)install in the main setup program will start up.



### 3.3.2 Installing the STL viewer

- ★ You chose to install the STL viewer in the main setup program. The installation wizard for the STL viewer has started up automatically.
- S 1.** From the **Please select a language** drop-down list select the language for the installation wizard and click on **[OK]**. You can choose between English and German. Here we assume that you select **English**.
  - ① [The STL viewer can display in English, German, French and Korean. It displays in the system language by default.](#)
- S 2.** In the next window click on **[Next >]**.
- S 3.** If you agree to the licence terms shown in the next window, activate the check box **I accept the terms of the License Agreement**. This is required to continue the installation.
- S 4.** Click on **[Next >]**.
- S 5.** If you want to change the standard installation folder, enter the desired folder name in the Destination Folder input field.
- S 6.** Click on **[Next >]**.
- S 7.** If you want to change the start menu folder, enter the desired name in the input field in the next window.
- S 8.** Click on **[Install >]**.
  - ➔ The installation wizard installs the STL viewer.
- S 9.** If you want to view a quick reference guide about the STL viewer's user interface, activate the **Show Quick Reference Card** check box in the next window. Otherwise deactivate it.
  - ① [A PDF reader is required to view the Quick Reference Card.](#)
- S10.** Click on **[Finish]**.
  - ➔ You have successfully installed the STL viewer.



### 3.3.3 Installing the USB driver

★ You chose to install the USB driver in the main setup program. The installation wizard for the USB driver „FTDI CDM drivers“ has started up automatically.

**S 1.** In the first window of the installation wizard, click on **[Extract]**.

**S 2.** In the second window of the installation wizard, click on **[Next >]**.

**S 3.** In the third window of the installation wizard, click on **[Finish]**.

➔ Windows automatically adds the USB driver to your system. The system informs you about the successful driver installation.

**IMPORTANT**

If Windows does not show the success message and does not recognize the USB driver automatically, you have to install the driver manually. Otherwise FINOCNC cannot connect to your CNC machine. Read the next passage for further information.

#### Installing the USB driver manually

★ Your computer is connected to the CNC machine with a USB cable. You can leave the CNC machine switched off.

**S 1.** Open the Windows control panel. Under Windows Vista and Windows 7 you find it in the start menu and under Windows 8 in the settings menu that you access with <WINDOWS KEY+I>.

**S 2.** In the control panel open the device manager.

**S 3.** In the tree structure expand the **Other devices** node.

➔ Unterhalb des Knotenpunkts **Andere Geräte** zeigt Windows den Eintrag **USB <-> Serial Cable** an. Ein gelbes Symbol mit Ausrufezeichen vor dem Eintrag weist auf einen unvollständig installierten Treiber hin.

**S 4.** Click with the right mouse button on **USB <-> Serial Cable** and select the context menu item **Update Driver Software...**

➔ The window **Update Driver Software** displays.

**S 5.** Click on **Browse my computer for driver software.**

➔ The window **Update Driver Software** now contains an input field that you can use to enter the storage location of the driver.

**S 6.** Click on **[Browse...]**.

➔ The window **Browse For Folder** displays.

**S 7.** In the installation folder of FINOCAM and FINOCNC open the folder **USB** and click on **[OK]**.

➔ The window **Browse For Folder** closes. The system enters the chosen folder into the text field in the window **Update Driver Software.**

**S 8.** In the window Update Driver Software click on **[Next]**.

**S 9.** In the window Windows Security click on **[Install]**.

**S10.** In the next window click on **[Close]**.

➔ You have successfully completed the first USB driver installation.

Install the USB driver for a second time. The differences to the first time are:

- The entry in the device manager below the node **Other Devices** is now **USB Serial Port**.
- In the dialogue **Update Driver Software** the input field already contains the correct storage location. You do not click on **[Browse...]**, but instead on **[Next]**.
- After the last step the device manager contains the entry **USB Serial Port (COM<x>)** below the node **Ports (COM & LPT)**. For <x> the system automatically inserts a port number.
- ➔ FINOCNC is now able to connect to the CNC machine.

### 3.3.4 Installing the runtime environment for C++

The Runtime environment for C++ is the technical basis for FINOCAM and FINOCNC. It does not have any function visible to the user.

#### NOTICE

#### Incorrect job execution when runtime environment is missing

When the runtime environment for C++ is not fully installed, jobs will not be calculated correctly in FINOCAM. This leads to an incorrect job execution.

➤ Fully install the runtime environment before working with FINOCAM.

★ You have installed the FINOCAM and FINOCNC core applications (⇒ page 9).

**S 1.** Open the folder with the core applications.

**S 2.** Open the folder **mw**.

**S 3.** In the mw folder open the ZIP file **vc redistrib\_x64\_vc9.zip** and copy the contained file **vc redistrib\_x64\_vc9.exe** into any empty folder.

① Possibly the file name includes a higher number after the vc. In this case the file is a newer version of the runtime environment. Install it as described.

**S 4.** Open the folder into which you copied the **vc redistrib\_x64\_vc9.exe** file.

**S 5.** Open the **vc redistrib\_x64\_vc9.exe** file.

**S 6.** If Windows asks you, whether **vc redistrib\_x64\_vc9.exe** may make changes to your computer, click on **[Yes]**.

➔ If the runtime environment or a higher version of it is already installed on your computer, the installation will be cancelled at this point with a corresponding error message. In this case the technical prerequisite for FINOCAM and FINOCNC already exists on your computer. Ignore all further instructions on installing the runtime environment for C++.

In the other case the installation wizard for the runtime environment displays.

**S 7.** In the first window of the installation wizard click on **[Next >]**.

**S 8.** If you agree to the licence terms shown in the next window, activate the check box **I have read and accept the license terms**. This is required to continue the installation.

**S 9.** Click on **[Install >]**.

➔ The installation wizard installs the runtime environment. If the installation is successful, the message **Microsoft Visual C++ Redistributable has been successfully installed** will display.

**S10.** Click on **[Finish]**.

#### IMPORTANT

### 3.4 Using the update feature

FINOCNC can automatically update itself and FINOCAM through the internet.

- To use this feature, connect your computer to the internet.
- A firewall can prevent the applications from recognizing and downloading new versions.
- Make sure that both applications have unrestricted access to the internet.

**IMPORTANT**



#### Updating the applications through an icon in the header

When FINOCNC recognizes a new version through an active internet connection, it displays the depicted icon in the header of the application window.

- S** To start the update, click on the icon.
- ➔ The application downloads the new version and installs it.

#### Searching for a new version in the FINOCNC application settings

In addition to the method described above, you can trigger a manual search for a new version in the application settings of FINOCNC:

- ★ FINOCNC is running (➔ page 51).
- S 1.** In the icon bar click on the depicted icon on the left, and then in the lower icon bar click on the depicted icon on the right.
- ➔ The machine control view displays.
- S 2.** In the left column click on the depicted icon.
- ➔ FINOCNC searches for a new version and indicates this in the info area. Depending on the technical circumstances this can take between one and multiple seconds.
- If the application does not find a new version, it shows a corresponding message in the info area.
- Otherwise a new window opens with information about the version that was found.



- S 3.** If FINOCNC found a new version and you want to install it, click on the depicted icon.
- ➔ The application downloads the new version and installs it.



### 3.5 Viewing the release notes

FINOCNC as well as FINOCAM contain a list of changes made in the individual versions. We recommend viewing these release notes after every update so that you are always informed about the applied changes.

- S** To view the release notes, click on the depicted icon in the header of the corresponding application window.
- ➔ The release notes display. In the left column you see the individual released versions and next to them on the right the applied changes.



# FINOCAM



**4 Introduction**

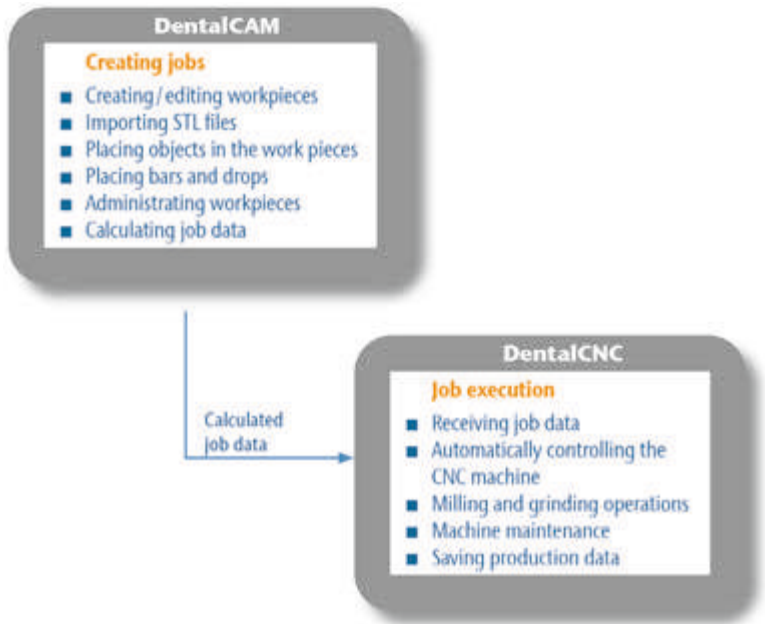
**4.1 The concept of FINOCAM**

In order to mill or grind with your CNC machine of the Impression series, you first create jobs in FINOCAM. These jobs contain all necessary information like, for example, the objects to be machined and their placement in the workpieces (blanks / grinding blocks). FINOCAM uses the information to calculate all data necessary for job execution. Afterwards, FINOCAM transfers the calculated data to FINOCNC.

FINOCNC controls the CNC machine and executes the jobs. Jobs can be executed independently from calculations.

For grinding jobs you need a suitable CNC machine. You may also need the optional wet grinding option. When we describe grinding jobs in these instructions for use, we assume that you use the required equipment. If you do not process grinding jobs, ignore the corresponding information.

**IMPORTANT**



**4.2 Intended use**

- Only use FINOCAM to calculate jobs for CNC machines that you can select in the application settings or that the application can read from a dongle (⇒ page 17).
- Only use the application on a fully PC compatible device under a supported operating system (⇒ page 8).
- Always use the newest version of FINOCAM that is released for your CNC machine and operating system. You receive the newest version from customer support or via the update function of FINOCNC.

All other uses are not intended. FINO GmbH cannot be held reliable for damage resulting from misuse.

## 5 The user interface

FINOCAM has a window for the application settings and a window for job processing. The whole job processing is done in this one window. Only for some functions does an own window open.

In order to use the many functions of the application, you open different views through an icon bar in the header of the application window. Every view contains control elements for one specific area of job processing.

- ① You also call up the window for the application settings through the icon bar. This window has its own icon bar (➔ page 23).

The icon bar in the window for job processing:

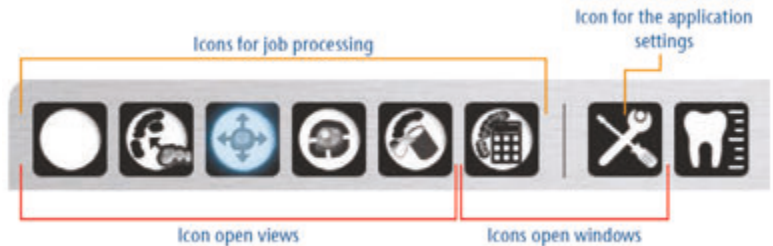


Illustration 3: The icon bar in the window for job processing

The icons open the following sections (from left to right):

- View for the workpiece archive
- View for importing STL files
- Nesting view
- View for placing bars and drops
- View for editing empty areas
- Window for calculating jobs
- Window for the application settings

The last icon has no function meant for the user.

- To open a view or a window, click on the corresponding icon.
- ➔ The application colours the chosen icon blue. Compare the icon for the nesting view above (➔ Illustration 3).

## 6 Starting and setting up FINOCAM

After installation it is recommended to adjust the application settings according to your working environment and conditions. You usually configure the settings only once. If necessary, however, you can change the settings at any time. It requires a restart for the application to apply any of our changes.

**IMPORTANT**

You start and configure FINOCAM as follows:

★ You have installed the application completely.

**S 1.** Start FINOCAM as follows:

- Through the desktop icon (if installed)
- Through the file **FINOCAM.exe** in the installation folder.

➔ The program window for job processing displays.

**S 2.** Click on the depicted icon in the icon bar.

➔ The Settings window opens.



### 6.1 Adjusting the general settings

★ You have called up the **Settings** window.

**S** Click on the depicted icon in the icon bar.

➔ The view for the general settings displays.



#### Specifying the interface language

**S** From the **Language** drop-down list select the language for the user interface.

#### Manually specifying the machine type

##### Incorrect job execution if the wrong machine type is chosen

If you specify the wrong type for the CNC machine which is executing the jobs, the application will calculate the job data incorrectly. This leads to an incorrect job execution.

- If possible, have the machinetype read from the dongle.
- If choosing the machine type manually, make sure to select the right type.

**NOTICE**

**IMPORTANT**

If you calculate jobs for multiple CNC machines with one computer, specify the corresponding machine type for the next job before the actual calculation.

**S 1.** Deactivate the **Read machine type from dongle** check field.

**S 2.** From the **machine type** drop-down list select the type of CNC machine for which you want FINOCAM to calculate the job data.

#### Configuring technical settings

In the middle area of the current window you mainly find technical settings.

**S** To activate or deactivate one of these settings, click on the corresponding check field.

You find descriptions of these settings in the following table:

Check field	Setting activated	Setting deactivated	Presetting / Recommendation
<b>Do not save data for error handling</b>	FINOCAM only writes data necessary for job execution.	When calculating job data, FINOCAM writes additional data which can help service technicians with troubleshooting	<b>Deactivated</b> Only activate this setting on request from customer service, because it may cause a huge amount of data being created on your hard drive.
<b>Automatically quit after installation</b>	After FINOCAM has completed the job calculation, it shuts down.	After the job calculation the user interface is shown again. The calculation itself is always done in the background.	<b>Deactivated</b> Activate this setting if you do not need the application directly after job calculation.
<b>Read machine type from dongle</b>	FINOCAM reads the machine type from the dongle. After the next application start you see the retrieved value in the current window beside the <b>Machine type</b> drop-down list.	FINOCAM uses the machine type which you select in the current window in the <b>Machine type</b> drop-down list.	<b>Activated</b> Activate this setting for safety reasons. If choosing the wrong machine type, the jobs will be calculated incorrectly.
<b>Different scaling in X, Y, Z</b>	When creating a work-piece, you can specify individual values for the X, Y and Z axis.	The scaling factor is always identical for all axes.	<b>Deactivated</b> Only activate this setting if you work with materials which need different scaling factors.

### Activating or deactivating the display of the import options

When you import STL data, FINOCAM can perform the following operations:

- Height optimization
- Search for divergent insertion vectors
- Search for drillings

① The search for divergent insertion vectors and for drillings are only performed when using a CNC machine with 5 axes.

These operations can either always be performed or you can specify for every individual object, which operations you want to be performed. The latter option allows you to save computer processing time (➔ page 36).

**S** If you want to decide on a per object basis which operations are performed, turn on the “import options” by activating the **Show import options** check field.

➔ Beside the import options, FINOCAM also shows value bars for the 5-axis release for outer surfaces if you use a 5-axis machine.

**S** If you want the mentioned actions to always be performed, deactivate the **Show import options** check field.



### Specifying the default processing status of calculated objects

Through the 3 option fields in the **Status of calculated objects** area you specify the default status which is assigned to already calculated objects.

**S** Activate the option field next to the desired status:

- **Do not process**  
The application assigns the processing status “do not process” to already calculated objects. The objects will not be machined again if the job is executed in the CNC machine once more. They function as “place holders”.
- **Process**  
The application assigns the processing status “process” to already calculated objects. The objects will be machined again if the job is executed in the CNC machine once more.
- **Already processed**  
The application assigns the processing status “already processed” to already calculated objects. The corresponding areas are shown as non-usable empty areas.

You find further information about the processing status of objects in the chapter on placing objects (➔ page 37).

### Activating or deactivating workpieces and materials for wet grinding

**S** If you use the optional wet grinding module, activate the **Wet grinding module available** check field. Only then will the corresponding workpieces and materials be available.

### Saving the settings

**S** Save your changes by clicking on the depicted icon in the bottom right corner of the window.



## 6.2 Specifying the processing settings

In the processing settings you specify for each material individual settings regarding the following topics:

- Bars
- Drops
- Oversize of fits
- Used tools
- Processing order

You specify the processing settings the following way:

★ You have called up the Settings window (➔ page 17).

**S** Click on the depicted icon in the icon bar.

➔ The view for the processing settings displays.

**S 2.** From the **Material** selection list on the left side of the window, select the material whose settings you want to adjust.

**S 3.** On the right side, specify the setting for the selected material as desired.



## Specifying the settings for bars

**S 1.** Adjust the calculation of bars in the **Bars** area through the following 3 value bars:

- **Diameter of node**  
Specify the diameter of node. The node is the starting point of the bar and always lies on the border of an object.
- **Opening angle**  
The opening angle specifies with how many degree the bar opens from the node towards the material border.

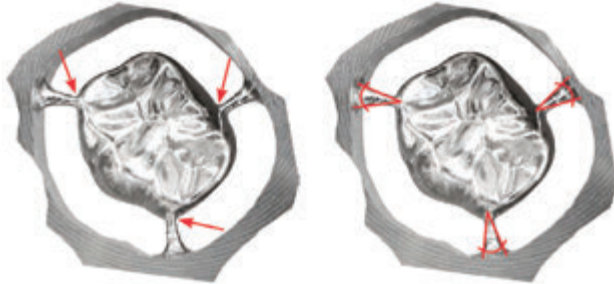


Illustration 4: Left: Nodes, Right: Opening angles

- **Reducing remaining areas**  
Specify by how many percent the bars will be reduced if the finishing type **Reduce bars** is selected.

**S 2.** In the **Oversize of fits** area use the **Cavity** and **Drillings** value bars to specify the oversize of fits in millimetres for the cavity and drillings.

## Specifying used tools

**S 1.** In the **Optional tools** area if for the selected material tools should be used that deviate from the standard:

- **Roughing with 1.5 mm flat ground cutter**  
This check field is only displayed for the materials PMMA (burn), wax and model plaster.  
Per standard your CNC machine uses a radius cutter (2 mm) for roughing. To save milling time, you can use a flat grinded cutter (1.5 mm) for the mentioned material instead.
- **Finish drillings with 1.2 mm flat ground cutter**  
Per standard your CNC machine uses a radius cutter (1 mm) for drillings. If you want to use a flat grinded cutter (1.2 mm) in addition to finish drillings, activate this check field. This allows you to precisely carve out 90° angles.

**S 2.** To finish drillings, cavities and fissures with a radius cutter (0.6 mm), activate the following check fields:

- **Finish drillings with 0.6 mm radius cutter**
- **Finish cavities with 0.6 mm radius cutter**
- **Use 0.6 mm radius cutter for fissures**

**IMPORTANT**

### Specifying diameter of drops

You can have drops conically taper. This prevents the tool from damaging the drop during job processing.

**S** In the **Diameter of drops** area at the bottom of the window specify the diameter of drops directly at the object (value bar **D0**) and at the remaining material (value bar **D1**).

**D0** may not be less than **D1** If your input violates this rule, FINOCAM equalizes the values of **D0** and **D1**.

**IMPORTANT**

### Specifying the sequence optimization

**S** Specify through the **Sequence optimization** drop-down list if you want the tools or the objects to determine the work order during job execution. For this select between the entries **Parallel processing** and **Individual processing**:

- **Parallel processing**

The tools determine the work order during job processing. First, the CNC machine processes *all* objects with *one* tool and then changes to the next tool until all objects are fully processed with all required tools.

The following diagram illustrates this work order using an example of 2 objects and 2 tools:

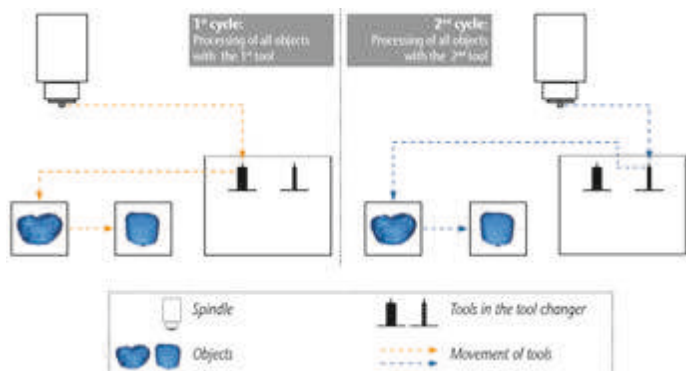


Illustration 5: Parallel processing

**Advantage of this work order:** The processing time of the job is reduced because the tools do not have to be changed too often.

**Disadvantage of this work order:** No object will be finished before the whole job is completed.

- **Individual processing**

The objects determine the work order during job processing. The CNC machine processes *every* object *completely* with all tools before starting with the next object.

The following diagram illustrates this work order using an example of 2 objects and 2 tools:

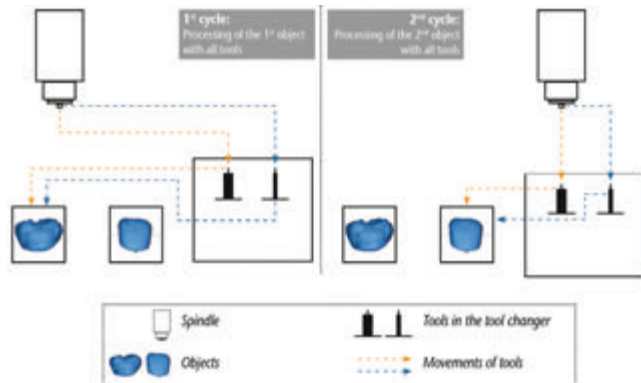


Illustration 6: Individual processing

**Advantage of this work order:** You can stop the CNC machine during job execution to check the processing quality by visually inspecting the already fully completed objects.

Do not remove the workpieces from the CNC machine during visual inspection. Even a slight deviation of positioning when inserting the workpieces again will result in the machine not finishing the job correctly.

**Disadvantage of this work order:** Longer processing time because the machine has to change tools frequently.

**IMPORTANT**

### Specifying the machining sequence

**S** Specify the processing order of the objects within one workpiece through the Machining sequence drop-down list:

- **DirectMill optimized**  
FINOCAM determines the optimal calculation and processing order for the object in each individual workpiece.
- **From left to right**  
The CNC machine starts with the most left hand object and ends with the most right hand object.
- **From smallest to largest object**  
The CNC machine starts with the smallest object and ends with the largest.
- **According to the list**  
The CNC machine processes the objects according to the import list from top to bottom. You create the import list in the view for importing STL files (⇒ page 26).

## 6.3 Specifying the data transfer settings



★ You have called up the Settings window (⇒ page 17).

**S 1.** Click on the depicted icon in the icon bar.

➔ The view for the data transfer settings display.

**S 2.** In the **Archive folder** text field enter the folder, where you want the data for the individual jobs to be stored.

**S 3.** In the **Folder for storing processing data** enter the folder, where you want the calculated job data to be stored. FINOCNC reads the data for job execution from this folder.

## 7 Creating workpieces and selecting them for editing

In this chapter we guide you step by step through a typical workflow of creating a new or administrating an existing job. Follow this guide especially during your first milling and grinding jobs. The workflow described here comprises the following points among others:

- Creating or loading a workpiece
- Choosing the material for new workpieces
- Importing STL data for the individual objects
- Placing objects in the workpieces
- Adding bars
- Calculating the job data

### Using the workpiece archive

At the beginning of job processing you either create a new workpiece or select a stored one from the archive.

★ You have started FINOCAM.

**S 1.** If the **Settings** window is open, close it. Restart FINOCAM to apply your changes.

**S 2.** Click on the depicted icon in the icon bar.

➔ The workpiece archive view displays. There you also create new workpieces.



If you want to edit an existing workpiece, continue with the designated chapter (➔ page 25).

### 7.1 Creating a new workpiece

You create workpieces in the New workpiece area.

**S 1.** From the **Material** drop-down list select the material you want to process.

If you select a grinding material, your choice applies to all grinding blocks that you insert into the block holder for the corresponding job. Therefore, only use grinding blocks of the same material for one job.

**IMPORTANT**

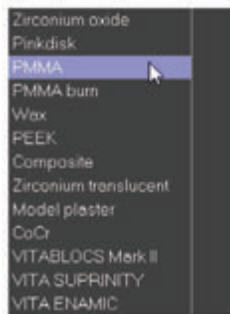


Illustration 7: Selecting a material for a new workpiece

① If you use the optional wet grinding module and want to create a grinding job, but the corresponding materials are missing in the list, check if you activated the **Wet grinding module available** check field in the general application settings (➔ page 17).

➔ FINOCAM displays default values for the selected material in the **Dimensions** and **Height** drop-down lists.

- S 2.** For grinding blocks select the size in the Dimension drop-down list. The drop-down list displays the different sizes as designated by the corresponding manufacturer.
- ① For blanks the drop-down list only contains the default diameter of 98.5 mm. You cannot change this value.
- S 3.** For blanks select the height in the **Height** drop-down list.
- ① For grinding blocks the height is determined by the block type which you selected in the **Dimensions** drop-down list. Therefore, you cannot change the **Height** value for grinding blocks.
- S 4.** In the Scaling input field enter in how far FINOCAM should compensate for the shrinking during sintering when placing objects in the workpiece.  
**Example:** 1.25.
- S 5.** If necessary, enter a lot number into the Lot number input field.
- S 6.** If necessary, enter a comment for the job into the **Comment** input field.  
Use comments for your notes about the job.
- S 7.** Click on the depicted icon below the **Comment** input field.
- ➔ FINOCAM assigns a unique ID number to the workpiece and adds a workpiece card into the **workpiece archive**. This card appears at the first position below the text Workpiece archive. The card contains a thumbnail of the workpiece as well as several job details.
- ① The colour of the workpiece helps you to recognize the material. For example, zirconium oxide is displayed as white and PMMA as yellow.



Illustration 8: Workpiece cards in the archive:  
On the left with a Blank, on the right with a grinding block.

The data on the workpiece cards from top to bottom:

- ID number
- Material
- Dimensions
- Height
- Lot number (if entered, otherwise you see a blank line)
- Scaling factor

Because the new workpiece is now in the archive, you can now select it for processing.

## 7.2 Selecting a workpiece from the archive

To process workpieces, you first select them in the workpiece archive. If you select a previously used workpiece, you can place additional objects onto the unprocessed areas, allowing you to use the workpiece further.

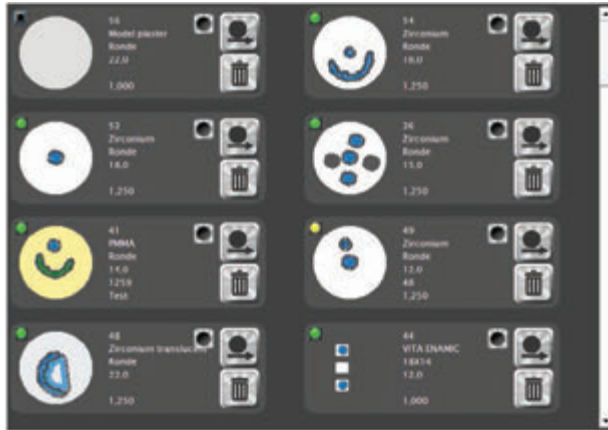


Illustration 9: Workpiece cards in the archive

① In this view you can also start the calculation of workpieces. As the job calculation is the last step of job processing, you find the description of this function later in these instructions for use (➔ page 45).

★ You have called up the workpiece archive which contains at least one workpiece card.

**S 1.** If the desired workpiece card is not shown on the first page of the archive, use the scroll bar at the right border of the window to search through the whole archive. If your archive is very large, we recommend using the filter (see below).

**S 2.** To edit a workpiece, click on the depicted icon in the corresponding workpiece card.



➔ If you selected a workpiece with *no* existing objects, the application switches to the STL file import. There you can import STL files containing objects (➔ page 26).

If you selected a workpiece *with* existing objects, the application switches directly to the nesting view. In this view you can move the existing objects (➔ page 26).

### Using the filter in the workpiece archive

In order to only show workpieces that meet certain criteria, use the filter in the **Filter** area. As soon as you change a filter criterion, FINOCAM adjusts the displayed workpiece cards immediately.

Note that all criteria are optional.

**S 1.** In the **Material** selection list mark the desired material. Selecting the entry **All** removes the filter.

**IMPORTANT**

- S 2. In the Dimensions selection list mark the desired dimension of the workpiece. Selecting the entry **All** removes the filter.
- S 3. In the Height selection list mark the desired height of the workpiece. Selecting the entry All removes the filter.
- S 4. Enter the ID number of the desired workpiece into the ID input field.  
As every **ID** can only occur once, you only filter out *one* single workpiece with this criterion. However, FINOCAM continues to apply the other filter criteria as well so that the desired workpiece may not display. Therefore, we recommend removing the other filter criteria so that they do not prevent the desired workpiece from being shown.
- S 5. Enter a lot number into the **Lot number** input field.
- S 6. Enter a combination of characters into the **Comment** input field which has to occur in the comment field of the desired workpiece. This function also finds combinations of characters within words. It is not case sensitive.

**IMPORTANT**

This function does not search comments for keywords but only for exact combinations of characters. For example, if you enter "Bridge zirconium oxide", this text has to occur in the comment field of a workpiece *exactly like this* for the workpiece to display in the archive. It is not sufficient if only "Bridge" or "Zirconium oxide" or "Zirconium oxide Bridge" occurs in the comment field.

### 7.3 Deleting a workpiece from the archive

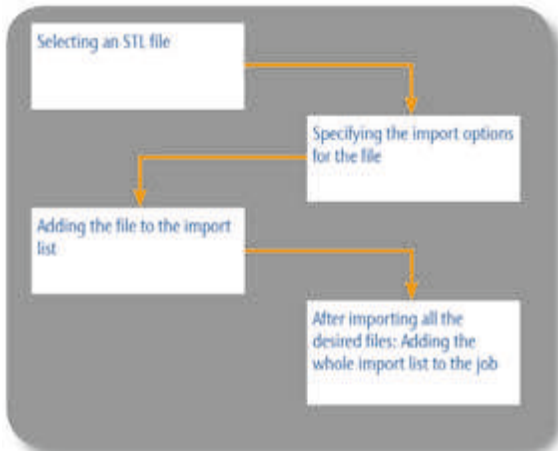


- ★ You have called up the archive.
- S 1. To delete a workpiece and with it the job, click on the depicted icon in the corresponding workpiece card.
- S 2. Confirm the safety prompt in the window that opens.  
➔ FINOCAM immediately deletes the workpiece from the archive.

## 8 Importing STL files

In order to place objects in a workpiece, you first have to import the corresponding STL files into FINOCAM.

The import of STL files is done in the following steps:





FINOCAM offers two options to select STL files:

- Via a file browser which you use to navigate to the desired files. When selecting files this way, you are very flexible, however, file selection takes a bit of time.
- Via a root directory into which you copy all STL files. FINOCAM only offers you the files in the root directory, which allows to select files quickly. However, you are limited to the files in the root directory.

Which option you choose is only a matter of your preference and does not affect the job editing in FINOCAM. You can switch between the two options at any time.

### Calling up the view for importing STL files

If you selected an empty workpiece in the archive, the view for importing STL files will display directly and you can skip the following step.



- ★ You have selected a workpiece for editing.
- S** Click on the depicted icon in the icon bar.
- ➔ The view for importing STL files displays.

## 8.1 Selecting an STL file via the file browser



- ★ The view for importing STL files is open.
- S 1.** In the top right corner of the window click on depicted icon.
- ➔ In the top area of the window the file browser displays: On the left you see the folder structure of the selected storage device (per standard your computer's hard drive) and on the right the files which are contained in the marked folder.

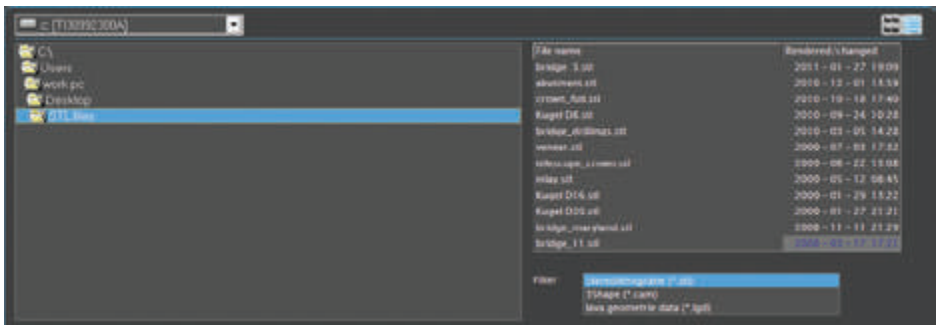
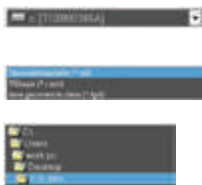


Illustration 10: The file browser in the view for importing STL files



- S 2.** If you want to change the storage device, select the device which contains your STL files from the depicted drop-down list in the upper left corner.
- S 3.** In the depicted Filter selection list mark the file format that your files use. The application does not show files in other formats.
- S 4.** In the depicted folder list doubleclick on the folder with the desired STL files.
- S 5.** In the file list mark the desired file. The file list looks like the root directory (⇨ Illustration 12).
- ➔ In the bottom left corner of the window FINOCAM shows the selected object from the top (left) and from the side (right).
- ⓘ If the application does not show one or both images, the corresponding preview has been disabled.

## 8.2 Importing STL files via a root directory

If you want to import STL files via a root directory, you first have to specify the directory. You can change it at any time.

**HINT**

If you change the root directory regularly, selecting files via the file browser may be the faster option (⇒ page 27).

### 8.2.1 Specifying the root directory



**S 1.** In the top right corner click on the depicted icon.

➔ The window for selecting the root directory opens.

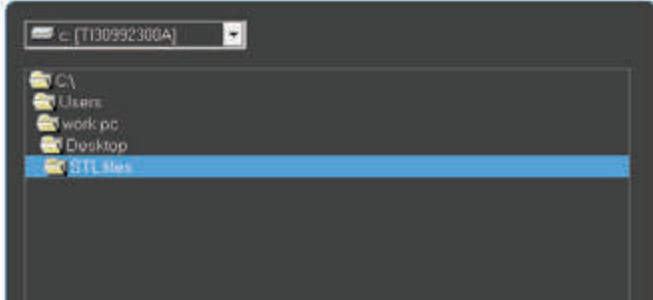


Illustration 11: Window for selecting the root directory

**S 2.** Navigate to the desired folder and mark it.

**S 3.** Click on the depicted icon.

➔ The window closes. FINOCAM saves your input.



### 8.2.2 Selecting STL files

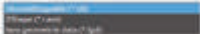
★ You have specified the desired root directory.

**S 1.** In the top right corner click on the depicted icon.

➔ In the top right area a list of files in the current root directory displays.

File name	Rendered / changed
bridge_3.stl	2011 - 01 - 27 19:09
abutment.stl	2010 - 12 - 01 13:59
crown_full.stl	2010 - 10 - 18 17:40
Kugel D8.stl	2010 - 09 - 24 10:28
bridge_drillings.stl	2010 - 03 - 05 14:28
veneer.stl	2009 - 07 - 03 17:32
telescope_crown.stl	2009 - 06 - 22 13:08
inlay.stl	2009 - 05 - 12 08:45
Kugel D16.stl	2009 - 01 - 29 13:22
Kugel D20.stl	2009 - 01 - 27 21:21
bridge_maryland.stl	2008 - 11 - 11 21:29
bridge_11.stl	2008 - 03 - 17 17:21

Illustration 12: STL file list (root directory and file browser)



If none of the existing files in the directory are shown, the filter possibly prevents the files from showing. For more information read the next instruction.

- S 2.** In the depicted **Filter** selection list mark the format of your files. The application does not show files in other formats.
- S 3.** In the file list mark the desired file.
  - ➔ In the bottom left corner of the window FINOCAM shows the selected object from top view (left) and from side view (right).
  - ⓘ If the application does not show one or both of the images, the corresponding preview has been disabled.

### 8.3 Activating or deactivating the STL file preview

In the view for importing STL files FINOCAM shows a preview for the marked file from top view and from side view. You can activate or deactivate both previews independently from each other.

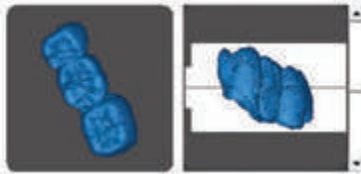


Illustration 13: STL file preview: Top View (left) and side view (right)

#### Toggling the visibility of the top view



- S** Click on the depicted icon.
  - ➔ The application adjusts the interface immediately. The icon changes colour: blue » the preview is activated, black » the preview is deactivated.

#### Toggling the visibility of the side view

If you deactivate the side view for an object that you moved vertically within the workpiece, you will lose this adjustment!

**IMPORTANT**



- S** Click on the depicted icon.
  - ➔ The application adjusts the interface immediately. The icon changes colour: blue » the preview is activated, black » the preview is deactivated.

### 8.4 Moving objects vertically within the workpiece

By default, objects are placed in the middle of the workpiece. You can, however, move objects to a specific vertical position in the workpiece.

- ★ In the view for importing STL files you have selected a file whose side view is shown as a preview. If necessary, activate the side view.
  - ⓘ If you have activated the side view and yet no corresponding preview of the object is shown, deactivate and activate the side view until the preview is shown.
- S 1.** Move the scroll bar on the right of the side preview to the top or the bottom. The horizontal line indicates the middle of the workpiece.
  - ➔ The preview image moves into the corresponding direction.

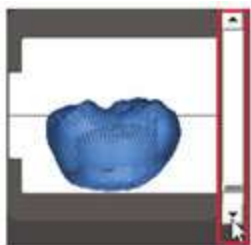


Illustration 14: Object that was moved down

**S 2.** As soon as the object is at the desired position, check if FINOCAM has marked areas at the top or bottom margin of the object in red. These areas are positioned outside the workpiece and cannot be processed by the CNC machine. The red areas can be very small. Check carefully!

**IMPORTANT**

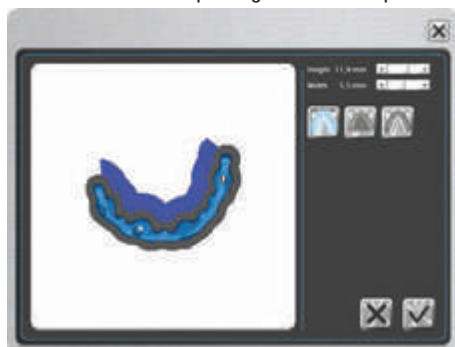
➔ You have specified the vertical position of the object in the workpiece.

## 8.5 Placing sinter bars or sinter plates

★ You have selected a file in the view for importing STL files.

**S 1.** Click on the depicted icon.

➔ The window for placing sinter bars opens.



Window for placing sinter bars/plates with sinter bar



**S 2.** To place a sinter bar, click on the depicted icon on the left.

To place a sinter plate, click on the depicted icon in the middle.

To place a sinter bar with connected end points, click on the depicted icon on the right.

➔ FINOCAM draws the sinter bar or plate into the illustration of the object (➔ Illustration 15).

**S 3.** If necessary, adjust the sinter bar or sinter plate with your mouse. For this, press and hold the left mouse button:

- You “draw” sinter bars along the object.
- When adjusting sinter plates, you drag the end points until the surface meets your requirements.
- You “draw” sinter bars with connected end points along the object. When you are finished, FINOCAM connects the end points automatically.

**IMPORTANT**



- S 4.** Set the height of the bar or plate in millimetres via the **Height** slider.
- S 5.** Set the width of sinter bar ins millimetres via the **Width** slider.  
The volume of the sinter bar or sinter plate should equal the volume of the object.

- S 6.** Click on the depicted icon.
  - ➔ The window for placing sinter bars and sinter plates closes. FINOCAM stores your input.

**8.6 Selecting the type of an object**

You specify the type of an object so that the application can calculate it correctly.

- ★ You have selected a file in the view for importing STL files.
- S** In the Object type selection list mark the appropriate type.
- ➔ If the **5 axis release outer surface** value bars display, they are set to the default value for the selected object type.
- ① The value bars only display if the **Show import option** check field is activated in the general application settings and if you are editing a job for a machine with 5 axes. (➔ page 17).

The object type will be indicated by an icon in the import list after the import. Which icon stands for which entry in the **Object type** selection list can be found in the description of the import list. (➔ page 33).

**8.7 Specifying the processing quality (precision)**

FINOCAM can calculate objects with different levels of precision. The lower the precision/quality, the faster the calculation and the execution in the CNC machine. The selected level of quality affects the distance between the milling paths on the outer surfaces. Fits, however, are always calculated with the same accuracy.

You activate or deactivate this function as follows:

- ★ You have selected a file in the view for importing STL files.
- S** Click on the depicted icon(s) as often as until the icon displays the desired number of stars. They indicate 3 different levels of quality:
  - 1 star = fast
  - 2 stars = standard
  - 3 stars = optimal



**8.8 Specifying the 5-axis release of an object**

- ① The value bars only display if the **Show import option** check field is activated in the general application settings and if you are editing a job for a machine with 5 axes. (➔ page 17).



With the two value bars in the **5 axis release outer surface** area you specify to what degree the rotary axes of the CNC machine will be slanted in order to machine the undercuts on the outer surfaces. The maximum angle is 15°.

The **Occlusal** value bar affects the top angle when machining object.  
The **Cavity** value bar affects the bottom angle when machining objects.

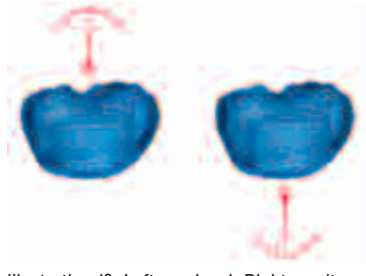


Illustration 16: Left: occlusal; Right: cavity

You use the function as follows:

- ★ You have selected a file in the view for importing STL files.
- S 1.** Specify the desired angle through the **Occlusal** value bar.
- S 2.** Specify the desired angle through the **Cavity** value bar.

## 8.9 Specifying the import options

Through the import functions you specify how FINOCAM processes the data files for job execution.

### IMPORTANT

FINOCAM only shows the import options if the **Show import options** check field is activated in the general application settings (➔ page 23). In addition, some of the import options also require a 5-axis machine.

**S** To activate or deactivate an import option, click on the corresponding icon.

➔ The icon changes and indicates the new status.

You normally deactivate import options to save computer processing time during the import. We recommend activating the import options for all objects.

FINOCAM offers the following import options (left icon – the corresponding option is activated, right icon – the corresponding option is deactivated):

### Height optimization

By default, objects are vertically centered within the workpiece with a setting angle of 0°.

If you activate the height optimization, FINOCAM automatically checks whether the object is too high for the selected workpiece. If this is the case, the application tries to place the object in the workpiece nevertheless by altering the setting angle.

### Search for divergent insertion vectors (only for 5-axis machines)

If activated, FINOCAM automatically checks whether the insertion vectors of the object are parallel to each other or if they are divergent. If they are divergent, the job will be executed with 5 axes.

### Search for drillings in objects (only for 5-axis machines)

If activated, FINOCAM automatically checks whether the current object has drillings and uses the result during job calculation.



## 8.10 The import list

The import list contains all imported objects before they are added to the job.

### 8.10.1 Adding an object to the import list

★ You have selected a file in the view for importing STL files and specified the import options.



**S 1.** Click on the depicted icon.

➔ FINOCAM adds the current object to the import list.

**S 2.** Check whether the application shows a green icon next to the height value of the new entry. In this case the height of the work piece is sufficient for processing the object. If the icon is red, the object is too high for the workpiece.

**S 3.** In case of a red icon, move the object vertically (⇨ page 29). If this is not successful, you have to create a different job for the object with a higher workpiece.



Illustration 17: Import list with two entries. The green icon indicates a sufficient height.

### 8.10.2 Removing an object from the import list

**IMPORTANT**

If you remove an object from the import list, no security prompt is shown. The object is deleted immediately.









**S** Click on the depicted trash can icon in the top right corner of the desired entry.

➔ FINOCAM removes the corresponding object immediately from the import list.

### 8.10.3 Changing the import options of an object after adding it










Via the import list you can adjust the import options for any object after it has been added to the list. FINOCAM indicates the selected import options for each object with the following icons:

Icon	Meaning
	Processing quality: fast
	Processing quality: standard
	Processing quality: optimal
	Height optimization activated

Icon	Meaning
	Height optimization deactivated
	Search for divergent insertion vectors activated*
	Search for divergent insertion vectors deactivated*
	Search for drillings activated*
	Suche nach Bohrungen deaktiviert*
	Extend of 5-axis release* Top value bar: Occlusal Bottom value bar: Cavity

- ① \*This option only displays if the **Show import option** check field is activated in the general application settings and if you are editing a job for a machine with 5 axes (➔ page 17).

In addition, the application also indicates the type of work through an icon:

Icon	Meaning
	Crown/bridge
	Crown/fully anatomical bridge
	Inlay
	Abutment
	Telescope crown
	Model plate
	Model cast
	Bite spline
	Model plug-in tooth



**Changing import options**

**S** Click on the corresponding icon in the import list.

➔ FINOCAM adjusts the corresponding import options and the icon indicates the new status.

For an explanation of the import options read the corresponding chapters in these instructions for use (➔ page 32-33).

**HINT**

**8.10.4**

**Adding the import list to the job**

In order to place objects in the workpiece, you add them to the job.

As soon as you have added objects to the job, you can no longer change their import options. If you want to change the import options of an already imported object nonetheless, you have to remove it from the job and re-import it with the desired options.

★ The import list contains the desired objects.

**S 1.** Click on the depicted icon.

➔ If at least one object is too high for the workpiece, you receive a corresponding message.

**S 2.** If objects are too high: To add them to the job nonetheless, click on the depicted icon on the left. In order to cancel the import for *all* objects, click on the depicted icon on the right.

➔ If you actually added objects to the job, FINOCAM immediately switches to the view for placing objects in the work piece (the “nesting view”).

① [In order to add additional objects to the job, call up the view for importing STL data again and repeat the steps described above.](#)



**9 The nesting view: Placing objects in the workpiece**

To place imported objects in the workpiece of the current job, you use the nesting view.

You can place an object only once per import. If you want to use an object multiple times, import the corresponding STL file as often as required.

**IMPORTANT**

**Calling up the nesting view**

If you added objects to the job via the import list, FINOCAM shows the nesting view automatically and you can skip the following step.

**S** Click on the depicted icon in the icon bar.

➔ The nesting view displays.



**The workpiece display**

On the right hand side of the nesting view you find the workpiece display which shows the workpiece with all imported objects. FINOCAM automatically places new objects in the middle of the workpiece display. From there you move them to the desired place. To use most of the surface area of blanks and to correctly position bars in grinding blocks, you also rotate the objects.

If you are editing a job that was already executed in the machine before, you may see black areas in the display view. These areas contain already machined objects and therefore cannot be used again. You can, however, place objects on the remaining unused areas to further use the partially processed workpiece. In the chapter on editing empty areas is described how to unlock the black areas to place objects on them again (➔ page 35).



Illustration 18: Two workpiece displays: Grinding block with three objects (left) and blank with two objects (right)

### The list of imported objects

You find a list with the imported objects in the middle of the left side panel. The familiar icons that are also used in the import list show the specified import options like the level of processing quality. However, you cannot apply any changes anymore.

Click on the icons to see a note in the info area about the import options. If you click on the file name of an entry, the corresponding object in the workpiece display is marked. For this to work, do not click on the thumbnail of the object at the left border of the list, because this will change the object's processing status (⇒ page 38).

HINT



Illustration 19: List of imported objects with two entries

## 9.1 Moving and rotating objects

★ You have called up the nesting view. The current job contains at least one imported object.

**S 1.** To move an object, position your mouse above the corresponding illustration in the workpiece display, press and hold the left mouse button and “drag” the object to the desired spot. Then release the mouse button.

If objects overlap too much or exceed the workpiece border, the application marks the affected areas in red. In addition, you receive a warning message in the top left corner of the workpiece display. If you do not correct this incorrect placement, you cannot calculate the job!

IMPORTANT

**S 2.** If necessary, rotate the objects to the left or the right:

- **Rotating in steps of 1°:**  
Press and hold the mouse button and press <ARROW KEYS UP> or <ARROW KEYS DOWN>.
- **Rotating in steps of 5°:**  
Press and hold the mouse button and press <ARROW KEYS LEFT> or <ARROW KEYS RIGHT>.
- **Rotating in steps of 90°:**  
Press and hold the mouse button and press <STRG+ARROW KEYS LEFT> or <STRG+ARROW KEYS RIGHT>.

## 9.2 Special requirements when placing objects in grinding blocks

FINOCAM automatically places one bar in every grinding block. It runs from the left side of the object to the block holder. FINOCAM determines the size of the bar on the basis of the size of the object.

**NOTICE**

### Insufficient adhesion of bars due to wrong placement

If bars are placed on concave surfaces and/or surfaces with too little material thickness, the adhesion of the bars may be insufficient.

- Before placing the objects, check their surface on the basis of the STL data and rotate them in the nesting view so that bars are only placed on convex surfaces of sufficient height. Read more information on this elsewhere (➔ chapter 10.5, page 42).

You do not see the automatically placed bar in the workpiece display.

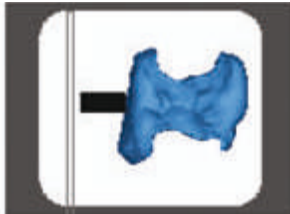


Illustration 20: Object in a grinding block with drawn in bar (in black)

### Keeping safety distances

When placing objects in grinding blocks, you have to keep safety distances on the left and on the right side.

On the left margin of the block you may not exceed the two lines. On the right margin of the block keep a short safety distance.

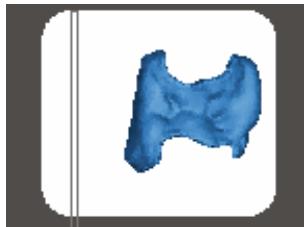


Illustration 21: Drawn in safety distances

**HINT**

The snap-to placement aid places objects in workpieces in the best possible way. For more information read the next section.

### Using the snap-to placement aid

With the snap-to placement aid positioning of objects in grinding blocks is fast and optimized for a correct job execution.

If you activate this aid, the application places the objects into a fixed, optimized position within the grinding blocks as soon as you drag them onto a block. You can then only move objects *between* but not *within* grinding blocks. The objects are anchored to the individual blocks.



Illustration 22: Object in a grinding block places with the snap-to placement aid

When the snap-to placement aid is deactivated, you place the objects freely with your mouse (➔ page 49).

#### IMPORTANT

For high quality grinding results use the placement aid. Especially after rotating objects, you should “drag” them a short distance *within the grinding block* if the placement aid is activated. The application then places the objects into an optimized position.

### Activating and deactivating the snap-to placement aid

★ You are currently editing a grinding block.

S Click on the depicted anchor icon in the top left corner of the workpiece display.

➔ FINOCNC toggles between activated and deactivated placement aid. Blue icon » activated placement aid, black icon » deactivated placement aid.



## 9.3 Specifying the processing status of objects

Through the thumbnails in the list with imported objects, you change the processing status of the individual objects. The colours of the illustrations change depending on the selected machining state.

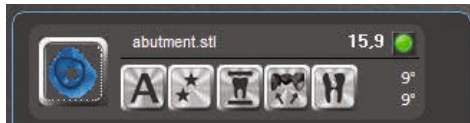










Illustration 23: Specifying the processing status

S Click as often on the thumbnail of the corresponding object as until the desired processing status displays.

You find the available processing statuses and the corresponding colours in the table below.

➔ FINOCAM colours the thumbnail and the object in the workpiece display in the colour of the selected processing status.

Workpiece display	Thumbnail	Assigned processing status
 Blue		<b>Process</b> – the object will be machined in the CNC machine.
 Dark blue		<b>Do not process</b> – the object will not be machined in the CNC machine. You cannot move the object in the workpiece display.
 Green		<b>Already processed</b> – the object has already been machined in the CNC machine. You cannot move the object in the workpiece display.
 Empty	 Black	<b>Deleted</b> – to remove objects from the job, you assign this state. FINOCNC removes the objects from the workpiece display, but not yet from the list of objects. There the thumbnail is displayed in black.

### 9.4 Removing objects from jobs

- S** To remove an object from a job, assign the processing status “deleted” to it.
- ➔ FINOCAM removes the object from the workpiece display immediately. In the list of objects, however, the object will still be listed until you call up the job in the workpiece archive again.

### 10 Setting bars and drops

After having placed objects in the workpiece, you set the required bars and drops for milling jobs. For grinding jobs there is exactly one bar per grinding block which is set automatically by the application (➔ page 37 and ➔ page 42). Therefore you cannot call up the view for settings bars and drops when editing grinding jobs.

**NOTICE**

#### Insufficient adhesion due to an incorrect placement of bars

If you place bars into the wrong position, their adhesion may be insufficient.

- Note the important information on setting bars (➔ chapter 10.4, page 42)

#### Calling up the view for settings bars and drops

- ★ You are editing a milling job.
- S** Click on the depicted icon in the icon bar.
- ➔ The view for setting bars and drops displays.



On the right side you see the workpiece display which shows the workpiece with the existing objects. You find the icons for setting bars and drops in the middle of the left side panel.

## 10.1 Setting bars



★ You have called up the view for setting bars and drops.

**S 1.** Select the finishing type for the bar you want to set by clicking on one of the depicted icons:

- **None** (left icon) – The bar will not be further machined after finishing (it displays white in the workpiece display)
- **Reduce** (middle icon) – The bar will be reduced after finishing (it displays yellow in the workpiece archive)
- **Remove** (right icon) – The bar will be removed after finishing (it displays orange in the workpiece display)

If you do not select a finishing type, the application assigns the preselected option **None**.

➔ The selected icon displays in blue.

You can also change the finishing type after setting a bar by pressing <STRG> (➔ page 44). To save time, we recommend specifying the finishing type *before* setting a bar.

**S 2.** Click on the depicted icon.

**S 3.** In the workpiece display click on the spot at the border of the desired object, where you want to set the bar.

➔ FINOCAM places the bar at the desired spot in the workpiece display.

① The active bar always displays in dark blue. As soon it is no longer active, its colour is determined by the assigned finishing type (see step 1).



HINT



Illustration 24: Object with two bars

In addition, the bar receives an entry in the table in the left side panel:

Nr.	Z 1	Z 2
1	-0,8	-0,8
2	-2,8	-2,8

Illustration 25: Table containing two bars

The table contains the following columns:

- **No** – A continuous number that is assigned to the bar. FINOCAM allocates this number automatically.
  - **Z 1** – Height coordinate of the node
  - **Z 2** – Height coordinate of the endpoint
- ① See the corresponding illustration for an explanation of the terms “node” and “endpoint” in the current context (➔ Illustration 26).

## 10.2 Changing the finishing type of bars

- S 1.** With the left mouse button click on the desired bar in the workpiece display.
  - ➔ FINOCAM displays the bar in the workpiece display in blue.
- S2.** Press <STRG> as often as until the desired finishing type is selected. The blue icon in the side panel indicates which finishing type is currently selected.

## 10.3 Moving bars vertically

By default, FINOCAM places bars with minimum distance above the equator of an object. If necessary, you can vertically move the bar. For this you adjust the height of the node (starting point of the bar) or of the end point of the bar. To do this, use the side view in the left side panel.

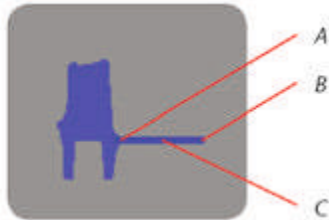


Illustration 26: Side view: Object with bar

A: Node      B: End point      C: Bar

If you set the node and the end point to a different height, FINOCAM positions the bar askew in the workpiece.

### Specifying the height of the node and the endpoint

If you want the height of the node and of the end point to be different, adjust the height of the node first. When you do this, FINOCAM positions the bar parallel to the equator. Therefore, if you moved the endpoint before the node, this change would be reverted.

**IMPORTANT**



- S 1.** Position the mouse pointer above the node [A] in the side view.
  - ➔ The mouse pointer takes the depicted shape.
- S 2.** Press and hold the left mouse key and “drag” the point upwards or downwards.
  - ➔ **a)** FINOCAM positions the bar parallel to the equator of the object.
  - b)** The height of the whole bar adjusts to the height of the node.
  - c)** The line in the table associated with the bar changes: The value in the **Z1** table column contains the new height of the node.

**S 3.** Release the mouse button.

**S 4.** To position the bar askew in the workpiece, position the mouse pointer over the endpoint in the side view [B].



- ➔ The mouse pointer takes the depicted shape.
- S 5.** Press and hold the left mouse button and “drag” the point upwards or downwards.
  - ➔ **a)** FINOCAM moves the endpoint and positions the bar accordingly.
  - b)** The line in the table associated with the bar changes: The value in the **Z2** table column contains the new height of the node.

**S 6.** Release the mouse button.

## 10.4 Moving bars horizontally

- S 1. In the workpiece display click on the desired bar and press and hold the left mouse button.
- S 2. „Drag“ the bar to the desired spot.
- S 3. Release the mouse button.

## 10.5 Important information on setting bars

For a successful job execution you have to place bars correctly. Regard the following information. You check the objects' surfaces on the basis of the STL models by using a suitable application.

### HINT

FINOCAM comes with an STL viewer which you can use to view STL files directly on the computer that is running FINOCAM. You find more information about this in the chapter on installing FINOCAM (⇒ page 7).

### 10.5.1 Placing bars on convex surfaces of sufficient height

When editing milling jobs as well as grinding jobs, you should place bars at convex surfaces with a sufficient material thickness. This prevents too low adhesion of the bars. Additionally, subsequent manual works may be required otherwise.

### IMPORTANT

For grinding jobs the position of the single bar is fixed. Therefore you influence the location where the bar touches the object by rotating the object (⇒ page 36). In the following illustration of an inlay the material thickness on the left side is too low to place a stable bar. However, the right side is suitable.



Illustration 27: STL model of an inlay with drawn in bars

To take this into account e.g. when placing an object for a grinding job, you rotate the object in the workpiece display accordingly. The side where you want the bar to touch the object must be on the left:



Illustration 28: The inlay in the workpiece display:  
On the left rotated correctly, on the right rotated incorrectly

This cap also has surfaces which are not equally suitable for bars. In the following illustration the bar is placed at a suitable, slightly convex surface:





Illustration 29: STL mode of a cap: Suitable surface for a bar

However, a different, concave surface is less suitable for bars:

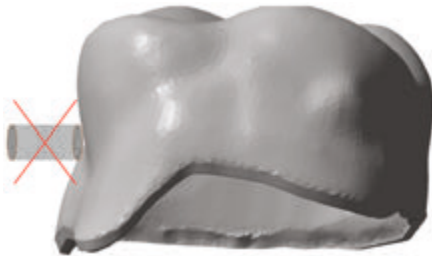








Illustration 30: STL model of a cap: Less suitable surface for a bar

Regard the quality of the surfaces for all objects and all jobs!

### 10.5.2 Additional information for milling jobs

**IMPORTANT**

In addition to information given above, regard the information in the following table when placing bars in blanks. Only then can jobs be executed achieving high quality results and without damaging the tools.

Correct ✓	Incorrect ✗	Description
		<p><b>Place bars evenly on all sides</b></p> <p>If you place bars on only one side, vibrations during job executions may occur. This can lead to the workpiece or tool getting damaged.</p> <p>Positive example (left): bars on all sides of the object. Negative example (right): bars on only one side of the object</p>
		<p><b>Place bars with sufficient distance from each other</b></p> <p>If the distance between bars is too low, the air nozzle may not be able to blow off chips as required, which can damage the tool.</p> <p>Positive example (left): bars with a suitable distance between them. Negative example (right): bars without a suitable distance between them.</p>
		<p><b>Set enough bars</b></p> <p>Per object you should at least place three bars because otherwise vibrations may occur during job executions. This can lead to the workpiece or tool getting damaged.</p> <p>Positive example (left): Enough bars set. Negative example (right): Too few bars set.</p>

## 10.6 Removing bars



- S 1.** Click on the depicted icon.  
**S 2.** Click on the bar in the workpiece display that you want to remove.  
➔ FINOCAM removes the selected bar immediately.

## 10.7 Settings drops



- S 1.** Click on the depicted icon.  
**S 2.** Click on the spot in the workpiece display where you want to place the drop.  
➔ FINOCAM creates the drop at the chosen position.

## 10.8 Removing drops



- S 1.** Click on the depicted icon.  
**S 2.** Click on the drop in the workpiece display that you want to remove.  
➔ FINOCAM removes the selected drop immediately.

## 11 Editing empty spaces

### HINT

This step is only necessary if the following two conditions apply:

- You are editing a job with previously calculated objects.
- So called “empty areas” are placed where the calculated objects used to be.

**When editing a newly created job, for example, you skip this step. In this case start the job calculation directly after setting bars and drops. Read the corresponding chapter for more information (➔ page 45).**

### What are “empty spaces” in FINOCAM?

Sometimes you have only placed and machined objects in some areas of a workpiece. FINOCAM shows these areas as empty areas where you cannot place new objects. After all, the CNC machine cannot machine new objects in these areas if you use the same physical workpiece.

However, perhaps you want to use a new physical workpiece for a job with already calculated objects. In this case, the empty areas shown in FINOCAM are in fact usable on the physical workpiece. Therefore, you unlock the empty areas in the application to place objects in the areas again.

### Calling up the view for editing empty areas



- S** Click on the depicted icon in the icon bar.  
➔ The view for editing empty areas displays.

On the right side you find the workpiece display which shows the workpiece with all existing objects. The application displays empty areas in black.

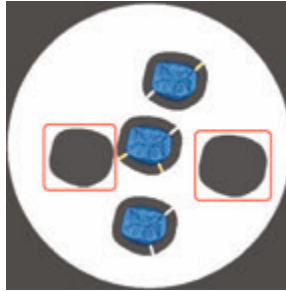


Illustration 31: Blank with two empty spaces (marked in red)

In the middle area of the left side panel FINOCAM lists all empty areas. A unique number and a check box are assigned to every empty area:



Illustration 32: List of empty areas

### 11.1 Unlocking empty areas

- ★ You have called up the view for editing empty areas. The displayed workpiece contains empty areas.
- S** Deactivate the check box for the empty areas that you want to unlock.
- ➔ FINOCAM hides the corresponding empty areas in the workpiece display immediately and unlocks them. You can now place objects in the areas via the nesting view and by that use the areas again (➔ page 35).

### 11.2 Locking empty areas

- ★ You have called up the view for editing empty areas. The displayed workpiece contains hidden empty areas.
- S 1.** In the side panel activate the check boxes for the empty areas which you want to lock.
- ➔ FINOCAM immediately displays the corresponding empty areas in the workpiece display. If objects overlap these areas, the application indicates this as usual.
- S 2.** If necessary, correct overlapping objects in the nesting view because otherwise you cannot calculate the job (➔ page 35).

## 12 Calculating jobs

After having fully prepared a job, you start the calculation of the milling and grinding data. FINOCAM sends these data to FINOCNC, which controls the job execution in the CNC machine.

Besides calculating an individual job, you can also calculate multiple jobs in succession via the workpiece archive (➔ page 47).

## 12.1 Calculating individual jobs

You start the calculation of individual jobs as follows:

- Through an icon in the icon bar
- Through an icon in multiple views

The views in which you can start the calculation are:

- The nesting view (➔ page 35)
- The view for setting bars and drops (➔ page 39)
- View for editing empty areas (➔ page 44)

In the mentioned views you find an area in the bottom left corner which contains the icon for starting the calculation, the estimated job execution time and the estimated job completion time.

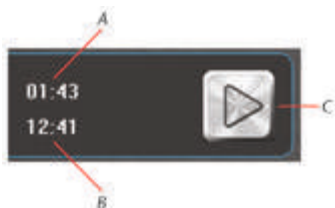


Illustration 33: Area for job calculation

A: Job execution time    B: Job completion time    C: Icon for starting the calculation

You start the calculation of an individual job as follows:

★ You are editing a workpiece in which objects are placed.

**S 1.** In the area mentioned above click on the depicted icon on the left, or in the icon bar click on the depicted icon on the right.

➔ **a)** In case the job is without errors the **Calculating job** window opens. It shows an overview of the job you want to calculate.

**b)** In case the job contains errors, e.g. overlapping objects, you will receive an error message. You find information about error messages that may occur when starting a job calculation in the corresponding chapter (➔ page 48).

**S 2.** If you want the application to create a report on the calculation, and you have Microsoft Excel installed, activate the **Write protocol** check field in the **Calculating job** window. FINOCAM launches Microsoft Excel with the report data at the end of the calculation.

Microsoft Excel has to be installed on the computer running FINOCAM. The application does not create a file that you can open on a different system.

**S 3.** Start the calculation by clicking on the depicted icon.

➔ FINOCAM hides the user interface and starts the calculation in the background. FINOCNC launches.

If FINOCNC does not launch, start it manually. FINOCNC controls the job execution in the CNC machine.

① Depending on the application settings, the user interface of FINOCAM displays again after the calculation has finished, or FINOCAM closes. You specify this in the general application settings (➔ page 17).



**IMPORTANT**



**IMPORTANT**

## 12.2 Calculating multiple jobs in succession

If you have prepared multiple jobs in FINOCAM, you can calculate them in one session. For this you use the multi-job calculation function in the workpiece archive:

★ You have prepared multiple workpieces which are listed in the workpiece archive.



**S 1.** To call up the workpiece archive, click on the depicted icon.

➔ The workpiece archive displays.

**S 2.** If desired, choose which workpiece cards are shown in the archive: In the **Multi-job calculation** selection list in the bottom right corner of the workpiece archive, select one of the following entries:

- **All**

The application shows all workpieces in the archive.

Note that other filter criteria still apply (➔ page 26).

- **Calculable jobs**

The application shows all workpieces with objects that need to be calculated.

- **Selected jobs**

The application only shows workpieces that you have selected for calculation (see step 3).

➔ FINOCAM displays the workpiece cards in the archive according to your selection.



**S 3.** Select the jobs you want to calculate by activating the depicted check field on the corresponding workpiece cards.



**S 4.** Click on the depicted icon in the bottom right area of the workpiece archive.

➔ The **Start calculation** window opens, where you can specify the order in which the workpieces will be calculated.

If you did not select at least one workpiece in step 3, you receive an error message in the info area and the windows does not open.

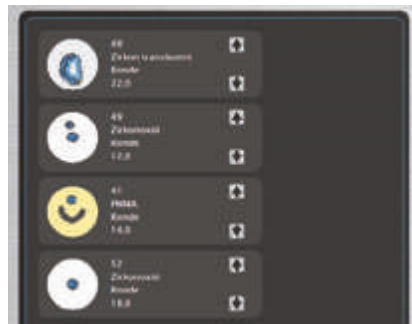


Illustration 34: Specifying the order for multi-job calculation

The window shows the workpiece cards of the jobs that you selected for calculation. They will be calculated from top to bottom.



**S 5.** To adjust the calculation order, click on one of the depicted arrow icon on the right border of the desired workpiece card..

➔ After every click on one of the arrow icons, FINOCAM immediately adjusts the order of the workpiece cards upwards or downwards.

**S 6.** If you want the application to create a report on the calculation, and you have Microsoft Excel installed, activate the **Write protocol** check field in the **Calculating job** window. FINOCAM launches Microsoft Excel with the report data at the end of the calculation.

Microsoft Excel has to be installed on the computer running FINOCAM. The application does not create a file that you can open on a different system.

**S 7.** Start the calculation by clicking on the depicted icon.

➔ FINOCAM hides the user interface and starts the calculation in the background. FINOCNC launches.

If FINOCNC does not launch, start it manually. FINOCNC controls the job execution in the CNC machine.

① Depending on the application settings, the user interface of FINOCAM is shown again after the calculation has finished or FINOCAM closes. You specify this in the general application settings (➔ page 17).

**IMPORTANT**

**IMPORTANT**

### 12.3 Error messages when calculation job data

The following error messages can occur when starting a job calculation:

Error message	Reason	Corrective action
<b>Set bars before calculating the job.</b>	For at least one object in the workpiece you have not set bars.	Set bars for all affected objects. (➔ page 40).
<b>Objects are overlapping.</b>	At least two objects in the workpiece are overlapping too much.	Position all affected objects so that they do not overlap. (➔ page 36).
<b>Object exceed the border of the workpiece.</b>	At least one object has been positioned so that it exceeds the workpiece border.	Position all affected objects in the workpiece within the available area. (➔ page 36).

# FINOCNC



## 13 Introduction

### 13.1 The concept of FINOCNC

FINOCNC is a control program for your CNC machine. Among other things, you use it for the following tasks:

- Receiving the calculated job data from the CAM software.
- Automatic controlling of the CNC machine for executing jobs.
- Controlling of individual machine functions (e.g. air extraction on/off)
- Milling of calibration and test specimens
- Administrating of the tool changer
- Archiving and restoring job data

The functions of FINOCNC are closely linked to the used CNC machine. Depending on the machine, different functions will be available. For example, only if you use a machine with a blank changer will the corresponding options display on the user interface.

Therefore the illustrations in these instructions for use may not always reflect the state of your software installation. In this case, missing options are not caused by a software error.

#### IMPORTANT

For grinding jobs you need a suitable CNC machine. You may also need the optional wet grinding option. When we describe grinding jobs in these instructions for use, we assume that you use the required equipment. If you do not process grinding jobs, ignore the corresponding information.

### 13.2 Intended use

- Only use the application on a fully PC compatible device under a supported operating system (⇒ page 8).
- Always use the newest version of FINOCNC that is released for your CNC machine and operating system. You receive the newest version from customer support or via the internal update function of FINOCNC.
- Use FINOCNC *only* in the *User mode*. Only participating in a special training at FINO GmbH entitles the user to run the application in the *Administrator mode*.

All other uses are not intended. FINO GmbH cannot be held reliable for damage resulting from misuse!

## 14 The user interface

You control FINOCNC almost completely through one application window. Only for some functions does an own window open.

- ① [Note the general information about the user interface which applies to FINOCAM as well as FINOCNC \(⇒ page 5\).](#)

### The icon bar in FINOCNC

In order to use the many functions of the application in only one window, you open different views through an icon bar in the header of the application window. Every view contains control elements for one specific section.

- ① [Through the icon bar you also call up the settings section. This section has an additional icon bar below the standard icon bar \(⇒ page 5!\).](#)



The following illustration shows the icon bar in the application window of FINOCNC:



Illustration 35: The icon bar in the application window of FINOCNC

The icon open the following sections (from left to right):

- Job execution view
- Tool administration view
- Job log view
- Settings view

- To call up a view, click on the corresponding icon.
- ➔ The application colours the corresponding icon in blue. See the icon for the job log view above.

## 15 Starting and configuring FINOCNC

After installation it is recommended to adjust the application settings to your working surrounding and conditions. For operation it is especially necessary to configure the connection to your CNC machine. You usually configure these settings only once. If necessary, however, you can change the settings at any time.

You start and configure FINOCNC as follows:

★ You have installed the application completely.

**S 1.** Start FINOCNC as follows:

- Through the desktop icon (if installed)
- Through the **FINOCNC.exe** file in the installation folder.

➔ The application window opens and the job execution view displays.

**S 2.** Click on the depicted icon in the icon bar.

➔ You switch to the settings section. This section has an additional icon bar below the standard icon bar:



Illustration 36: Additional icon bar in the settings section

This additional icon bar opens the following views (from left to right):

- Application settings view
- Tool availability view
- Machine geometry view
- Machine control view

### 15.1 Specifying the application settings

**IMPORTANT**

It requires a restart for the application to take any changes you made into account.

★ You have called up the settings section.

**S** Click on the depicted icon in the lower icon bar.

➔ The application settings view displays.



## Specifying the user interface language

**S** From the **Language** drop-down list select the user interface language.

## Specifying the user profile



**Crushing hazard and danger of cuts due to moving machine parts when using the profiles “Administrator”, “Production” and “Trade fair”.**

If you use a different profile than the standard User profile, you can cause crushing injuries and cuts to yourself and others. In addition, in these profiles several safeguards of the CNC machine are switched off.

- Use FINOCNC with the **User** profile only unless you have been authorized by FINO GmbH to use different profiles.
- Always switch to the **User** profile when you do not need any of the other profiles anymore. In regard to this, read step 3 of the following instructions.

**S 1.** In the User profile area activate the option field for the desired profile. The profiles determine the available functions and operating parameters of FINOCNC:

- **User**  
Standard profile for the daily job execution and the basic machine control.
- **Administrator**  
Advanced machine control for repairing and maintaining through service technicians.
- **Production**  
Provides options for adjusting the machine during manufacturing.
- **Fair trade**  
Allows for the simulation of job execution without compressed air (“demonstration mode”) and without the corresponding safeguards like the compressed air or vacuum sensor. Usable e. g. at fair trades where no compressed air connection is available. The spindle with the tool moves “through the air” above the pre-processed workpiece to demonstrate how the CNC machine operates.

**S 2.** Except for the **User** profile, enter the corresponding password. The password are given to authorized users by FINO GmbH.

**S 3.** If you want FINOCNC to automatically set the profile to User after the next restart but one, activate the **Reset profile to “user” after second start of the software** option field.

The function works as follows:



### Activating cleaning reminder

**S** In order to receive one message per day which reminds you to clean the CNC machine, activate the **Cleaning reminder** check field.

### Specifying the source of job data

To execute jobs, FINOCNC needs job data previously calculated by a CAM application. You can import these job data in two ways:

- If you use FINOCAM: FINOCNC automatically imports new jobs from a fixed folder and offers them for execution.
- Via an icon in the job execution view, which you use to manually add job data created by a different application than FINOCAM.

You can use both import options alongside each other.



**S 1.** If you want the depicted icon for the manual import of CAM data to display in the job execution view, activate the **Import icon for external CAM data** check field.



**S 2.** If you use FINOCAM: To specify the folder for the automatic import, click on the depicted icon and choose the desired folder in the window that opens.

### Specifying the duration of job data storage

**S** Specify through the Number of days of data storage drop-down list for how long the data of already executed jobs will be stored. As long as jobs are stored, you can restore them via the log to execute them again (➔ page 86).

After the specified time period FINOCNC deletes the data automatically. The jobs will still be listed in the job log, however, you will no longer be able to restore them.

### Specifying the USB port number

FINOCNC communicates with the CNC machine through an USB connection. For a successful connection the right port must be set. You can try to automatically detect the right port via FINOCNC



**S** To automatically detect the port, click on the depicted icon.

➔ If the application is able to detect the port number, it enters the number into the **Port number** input field.

If FINOCNC does not detect the port number, you have to enter it manually.

You enter the port number as follows:

**S 1.** Open the control panel:

- Windows 7 and Windows Vista: In the start menu click on **Control panel**.
- Windows 8: Press <WINDOWS KEY + I> and then click on **Control panel** in the **Settings** side panel.

➔ The control panel opens.

**S 2.** Double-click on the **Device manager** entry.

➔ The **Device manager** window opens.

**S 3.** In the tree view open the node **Ports (COM&LPT)**

➔ The node contains an entry **USB Serial Port (COM<x>)**.

<x> stands for the required port number.

**S 4.** In FINOCNC enter the port number in the **Port number** input field.

**S 5.** Close the device manager and the control panel.



### Marking the blank position

If the CNC machine marks blanks at their border with one or two holes, re-inserting them in the same position is made easier for you.

**S** To turn on this function, activate the Mark blank position check field.

### Activating air extraction when the front cover is opened

When cleaning the working chamber of your CNC machine, it is recommended to activate the air extraction. Therefore you can specify that the air extraction is automatically turned on when you open the front cover.

**S** To turn on this function, activate the **Activate the air extraction when opening the front cover** check field.

## 15.2

### Configuring tool types

#### 15.2.1

### Information about tool types

#### Structure of tool names in FINOCNC

Form|Diameter|Material




Example: R100 Z

**R** Abbreviation for radius cutter

**100** 1,0 mm diameter

**Z** Suitable for the material “zirconium oxide”

#### Tool forms

Abbreviation	Meaning	Form of cutting edge
R	Radius cutter or radius grinding tool	
F	Flat ground cutter	
T	Torus grinding tool	

#### Materials and associated tool rings

Different tools are suitable for different materials. You recognize the material the tool is designed for by the final letter in the tool name.

Abbreviation	Meaning
Z	Zirconium oxidd
K	Plastics
N	Composites
NEM	NEM (non-precious alloys)
G	Glass ceramics

At the tool itself you recognize by the ring colour for which material the tool is suitable.

Material	Ring colour	Example in FINOCNC
Composites	Orange/yellow  	R200 <b>N</b>
NEM	Red 	R200 <b>NEM</b>
PMMA	Silver 	R200 <b>K</b>
Zirconium oxide	Green/light blue/dark blue   	R060 <b>Z</b>

### 15.2.2 Viewing tool data

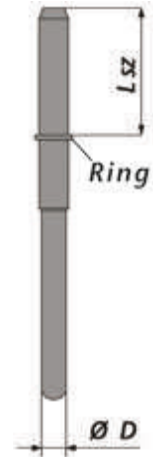
In the **Tool availability** view FINOCNC lists all tools that are available for your CNC machine by FINO GmbH.



- ★ You have called up the settings section.
- S** In the lower icon bar click in the depicted icon.
- ➔ The **Tool availability CAM software** view opens.

The table shows the following information about the tools:

- **Name**  
The tool name (short form) in FINOCNC.  
The structure is explained in the previous chapter (➔ page 54).
- **D**  
The cutting edge diameter in millimetres.
- **Cutting edge geometry**  
Either **Face radius** or **Flat ground** depending on the corresponding cutting edge geometry.
- **h**  
The tool life hours.
- **T**  
A unique identification number for the tool type.



**IMPORTANT**

The tool position in the tool changer is also designated with the letter T. However, there the following number starts with a 0 (e.g. T03).

- **L sz**  
The tool shank from top to the ring in millimetres.

The function of the **Press down** column is described further below (➔ page 56).

### 15.2.3 Specifying the tool life

In the **Tool availability CAM software** view you specify the tool life for each tool type. The tool life is the maximum number of operating hours that the tools can be used before it is worn.

FINOCNC stores the remaining operating hours for each tool type separately: The application subtracts the time in use automatically when the tool is used during job execution and updates the remaining tool time accordingly. This way you always keep track of the life of your tools which allows you to replace tools in time.

In addition to the decimal value FINOCNC displays the tool life as a value bar. The green portion stands for the remaining time, and the red portion stands for the time that the tool has already been used.



Illustration 37: Value bar for displaying the tool life

On the left: New tool

On the right: Tool after multiple operation hours

To make sure that FINOCNC knows the maximum life of each tool, you specify it as follows:

★ The **Tool availability CAM software** view is being displayed. (⇒ page 55).

**S 1.** In the h column enter the maximum tool life for the corresponding tool type.

Format: Decimal value in hours (e. g. 12,0 for 12 hours).

**S 2.** Press <ENTER>.

### 15.2.4 Activating the press down function for tools

When the spindle of your CNC machine puts a tool into the tool changer, it may not push the tool into the position completely. For this reason, you can specify for each tool type that after putting the corresponding tool into the tool changer the spindle presses the tool into the position again. This makes sure that the tool is pushed in completely.

**IMPORTANT**

This function increases the tool change time only marginally, however, it decreases the risk of an incompletely pushed in tool significantly. Therefore we recommend turning on this function for every tool type.

You activate this function for individual tool types as follows:

★ The **Tool availability CAM software** view is being displayed (⇒ page 55).

**S** Activate the check fields in the Press down column for the desired tool types.

### 15.2.5 Configuring the manual tool change

By default, the CNC machine uses the built-in tool changer to change the tools during job execution. In some cases such as the following, this may not be desired for specific tool changer positions:

- A position in the tool changer is worn so that it can no longer properly hold any tools.
- You use a tool which does not fit into the tool changer.

For these cases you specify in the machine geometry view that the machine performs a manual tool change for the corresponding positions.



★ You have called up the settings section.

**S 1.** Click on the depicted icon in the lower icon bar.

➔ The machine geometry view displays.

In the **Positions of tools** section on the right hand side, you find a list of all tool changer positions of your CNC machine.

T01	12,318	3,650	43,522	80,104	29,406	
T02	17,318	11,650	43,522	80,104	29,406	
T03	12,318	19,650	43,522	80,104	29,406	
T04	12,318	27,650	43,522	80,104	29,406	
T05	12,318	69,650	43,522	80,104	29,406	
T06	12,318	77,650	43,522	80,104	29,406	
T07	12,318	85,650	43,522	80,104	29,406	
T08	12,318	93,650	43,522	80,104	29,406	
T09	4,318	3,650	43,522	80,104	29,406	
T10	4,318	11,650	43,522	80,104	29,406	
T11	4,318	19,650	43,522	80,104	29,406	
T12	4,318	27,650	43,522	80,104	29,406	
T13	4,318	69,650	43,522	80,104	29,406	
T14	4,318	77,650	43,522	80,104	29,406	
T15	4,318	85,650	43,522	80,104	29,406	
T16	4,318	93,650	43,522	80,104	29,406	

Illustration 38: List of tool changer positions with entries T01-T16

The first column contains the corresponding position number with a preceding T. The last column indicates if the manual tool change is activated for the corresponding position or not.



- Black hand icon: Manual tool change is deactivated
- Blue hand icon: Manual tool change is activated

① The columns 2 to 6 contain technical position data which the CNC machine needs for the automatic tool change. They are mainly used during machine maintenance and therefore are not described here any further.

**S 2.** For all positions you want to toggle between a manual and an automatic tool change, click on the corresponding hand icon.

➔ a) FINOCNC changes the colour of the icon.

b) From now on the tool change will be performed according to the new setting.

### 15.3 Unlocking a wet grinding module for the CNC machine

If you have added the optional wet grinding module to an existing CNC machine, you need to unlock it *once only* before using it for the first time. You can do this in FINOCNC in two places:

- Through the icon for the pump control (preferred)
- In the machine geometry view.

➤ If the unlock code is invalid or missing, contact customer support.

#### Unlocking the wet grinding module through pump control

This is the preferred option because this way you spray liquid into the working chamber and remove air from the system. This is required before executing the first grinding job.

- ★ a) You have installed the wet grinding module as described in the operating manual and filled in the water emulsion. The module's display is activated.
- b) The CNC machine which is supposed to be used with the module is switched on and connected to the computer.
- c) You have called up the settings section in FINOCNC.

**S 1.** Click on the depicted icon in the icon bar.

- ➔ The machine geometry view displays.

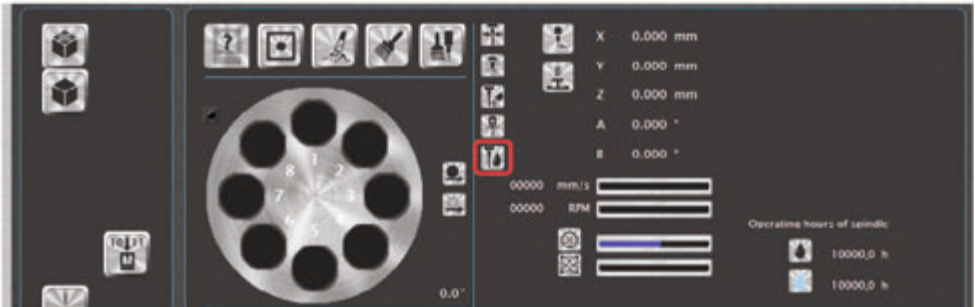


Illustration 39: Part of the machine geometry view

Check field for unlocking the wet grinding module marked in red



**S 2.** Click on the depicted icon.

- ➔ A window opens requesting you to enter the unlock code.

**S 3.** Enter the unlock code that you received with the wet grinding module.

- ➔ If the unlock code is valid, the wet grinding module is unlocked for the connected CNC machine.

### Unlocking the wet grinding module in the machine geometry view

In the machine geometry view you can unlock a wet grinding module without spraying water into the working chamber.

- ★ a) You have installed the wet grinding module as described in the operating manual and filled in the water emulsion. The module's display is activated.
- b) The CNC machine which is supposed to be used with the module is switched on and connected to the computer.
- c) You have called up the settings section in FINOCNC.

**S 1.** Click on the depicted icon.

- ➔ The machine geometry view displays.







Illustration 40: Part of the machine geometry view  
Check field for unlocking the wet grinding module marked in red

- S 2.** Activate the **Wet grinding module unlocked** control field.
  - ➔ A window opens requesting you to enter the unlock code.
- S 3.** Enter the unlock code that you received with the wet grinding module.
  - ➔ If the unlock code is valid, the wet grinding module is unlocked for the connected CNC machine.

## 16 Defining your tool stock and tool magazines

You specify your tool stock (all tools you have available) and up to 3 tool magazines (tools in the tool changer of your CNC) in the tool administration view.



- S** Click on the depicted icon in the icon bar.
- ➔ The tool administration view displays.

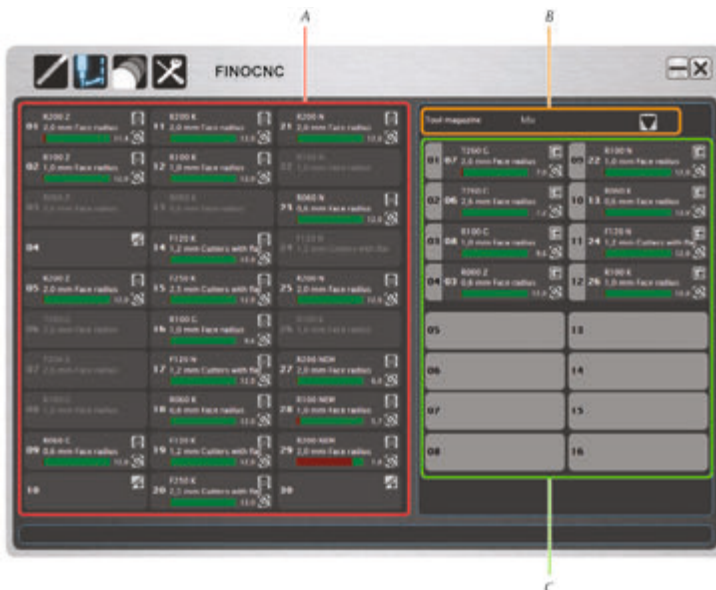


Illustration 41: The tool administration view with drawn in areas  
A: Your tool stock    B: Tool magazin selection    C: Selected tool magazine

## 16.1 Tool cards

In the inventory list [A] as well as in the tool magazine display [C] every tool type is represented by a corresponding tool card:

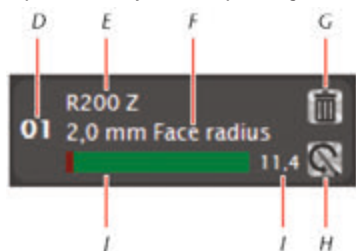


Illustration 42: Tool card in the inventory list

- |    |                                  |    |   |
|----|----------------------------------|----|---|
| D: | Serial number                    | H: | Icon "Reset remaining tool life"        |
| E: | Short tool name                  | I: | Remaining tool life as al decimal value |
| F: | Long tool name:<br>diameter&form | J: | Value bar for the tool life             |
| G: | Icon "Delete tool"*              |    |   |

\* In the tool magazine display replaced by the icon for removing the tool from the magazine (⇒ page 61).

## 16.2 Editing the tool stock

The tool stock list [A] contains all tools type in your stock. It offers positions for 30 entries.

FINOCNC displays tool cards in three different ways: (⇒ Illustration 43)

- An empty tool card if no tool type is specified for the position.
- Bright display if a tool type is specified for the position which is not assigned to the currently selected tool magazine [C].
- Dark grey display if a tool type is specified for the position which is assigned to the currently selected tool magazine [C].

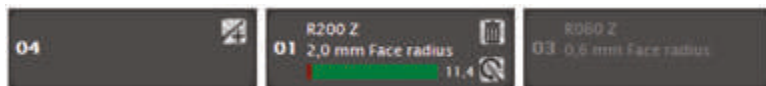


Illustration 43: Different tool card displays

### 16.2.1 Adding a tool type to the stock



**S 1.** In an empty tool card click on the depicted icon.

➔ The tool types available in the application are offered to you in a list.

**S 2.** Select the desired tool type from the list.

➔ The selected tool type takes the corresponding position in the stock list.

① The added tool type is not yet assigned to a tool magazine. Read in the corresponding chapter how to do this (⇒ page 62).

### 16.2.2 Removing a tool type from the stock

★ The tool type not assigned to any tool magazine. Otherwise remove it from all magazines.



**S 1.** In the desired tool card click on the depicted icon.

**S 2.** Confirm the security prompt.

➔ FINOCNC replaces the affected tool card with an empty tool card.

### 16.2.3 Organizing the tool stock with the Administrated Tool Board

For organizing the tools outside the tool changer of the CNC machine, we recommend the Administrated Tool Board (ATB). It offers 30 slots which correspond to the 30 tool cards of the stock list in FINOCNC.

If you keep the tools in the ATB and in the stock list identical, all information about the tool life, geometry etc. remain linked to the corresponding tools, and you have a much greater selection of tools at your disposal. If you are interested in the ATB, contact your reseller.



Illustration 44: The Administrated Tool Board With 30 tool positions



Illustration 45: The tools in the ATB correspond to the tool stock list in FINOCNC

## 16.3 Editing tool magazines

A tool magazine in FINOCNC represents a set of tools in the tool changer of your CNC machine. In the tool administration view you specify up to 3 magazines which you can quickly select while preparing the job execution.

On the basis of the tool magazines the application knows where to move the spindle e. g. to change the tools. Therefore you have to specify at least one tool magazine before job execution.

There are 3 magazines available with the following names:

- **Mix**
- **Zirconium oxide**
- **Plastics**

### HINT

It is your choice if you select the tools according to the magazine names or if you use your own classification schema. However, you cannot change the magazine names in the application.

### Selecting tool magazines

In the right area of the view [C] you find the currently selected tool magazine. Its depiction corresponds to the tool changer in your CNC machine. The individual tool changer positions are numbered accordingly. If a tool is assigned to a certain position, FINOCNC shows the corresponding tool card. Otherwise you see a grey area.



Illustration 46: On the left: tool card for the assigned tool, On the right: position without an assigned tool

- S** To select a tool magazine for editing, select it in the **Tool magazine** drop-down list [B].

### 16.3.1 Adding tools to a magazine

- ★ **a)** You have selected the tool magazine you want to edit.
  - ★ **b)** The tool you want to add is in the tool stock list and is not already assigned to the magazine.
- S 1.** In the stock list [A] click on the desired tool card and hold the left mouse button.
- S 2.** “Drag” the tool card to the tool magazine display [C] and “drop” it onto the desired empty position.
- ➔ The tool card occupies the former empty space in the magazine display and the tool card in the stock list is displayed in grey.

### 16.3.2 Removing tools from a magazine



- ★ You have selected the tool magazine you want to edit.
- S** In the tool magazine display [C] click on the depicted icon within the desired tool card.
- ➔ The application removes the tool card from the magazine display and displays it in full brightness in the stock list.

## 16.4 Resetting the remaining tool life

If you replace a used tool with a new one with an identical geometry, you should reset the operating hours counter of the tool at the same time. Only then does the application show the remaining tool life correctly.

★ You have called up the tool administration view (➔ page 59).

**S 1.** If you want to reset the remaining tool life of a tool assigned to a tool magazine, select the corresponding magazine through the **Tool magazine** drop-down list [B].



**S 2.** Click on the depicted icon within the desired tool card either in the tool stock list [A] or in the tool magazine display [C].

**S 3.** Confirm the displayed message.

➔ The application displays the bar for showing the remaining tool life almost fully in green.

## 17 Executing jobs

Controlling the job execution in the CNC machine is the main function of FINOCNC.

**S** In the icon bar click on the depicted icon.

➔ The job execution view displays.

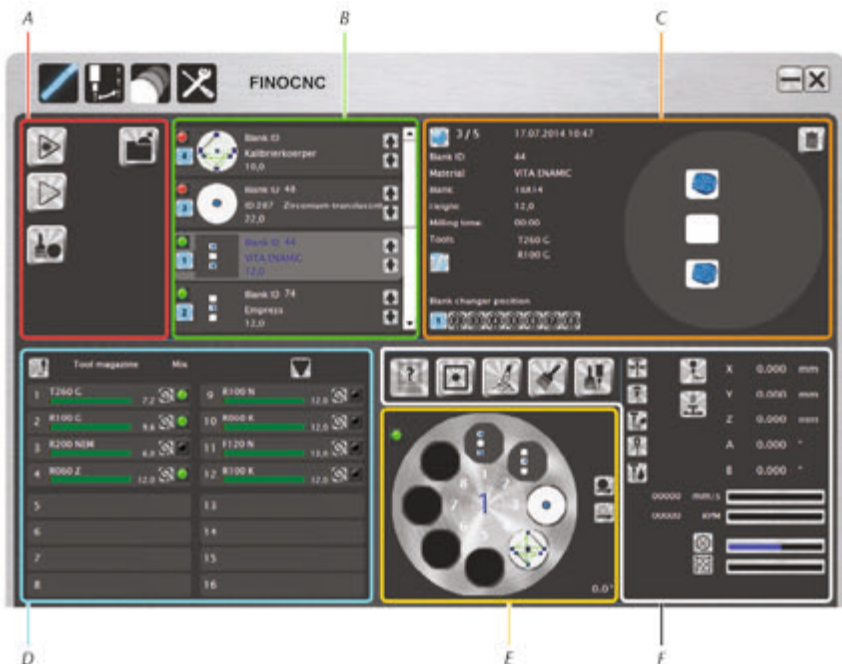


Illustration 47: Job execution view with drawn in coloured areas

A: Icons for job execution

B: Job list

C: Details/icons for the currently selected job

D: Current tool magazine

E: Blank changer illustration

F: Icons for individual machine functions

- ① The blank changer illustration is only shown when using a CNC machine with a blank changer. The icons for individual machine functions do not belong to the job execution and are described elsewhere (➔ page 76).

When using a CNC machine with a blank changer, you have the following options while preparing a job for execution:

- You execute one job using one workpiece.
- You execute multiple jobs with the *same* workpiece ID using *one* workpiece.
- You execute multiple jobs with *different* workpiece IDs in succession which are machined using *different* workpieces. The machine loads the workpieces from the blank changer during job execution.

When using a CNC machine without a blank changer, you have the following options while preparing a job for execution:

- You execute one job using one workpiece.
- You execute multiple jobs with the *same* workpiece ID using *one* workpiece.

The following table gives an overview of the individual steps during job execution, separated in machines with and without a blank changer:

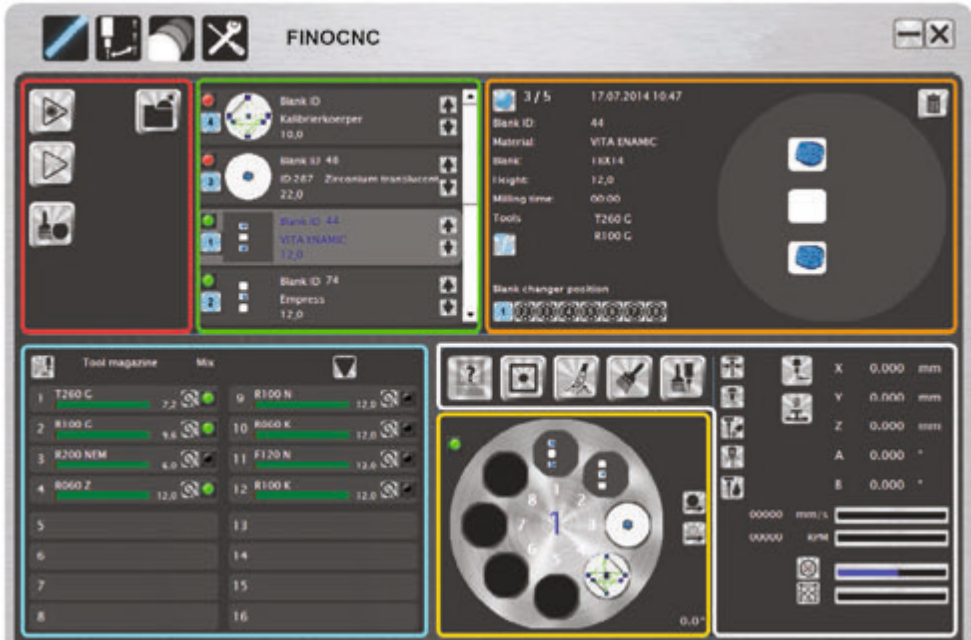
Step	Machines without a blank changer	Machines with a blank changer
1	If you do not use FINOCAM: Importing job data	
2	Selecting the job to execute	If you execute one job: Selecting the job If you execute multiple jobs: Activating or deactivating the individual jobs
3	Activating of wet processing for corresponding jobs	Activating of wet processing for all corresponding jobs
4	<i>not applicable</i>	If you execute multiple jobs: Specifying the order in which the jobs will be executed.
5	Specifying, if the workpiece(s) will be blown off after job execution	
6	Selecting a suitable tool magazine	
7	Checking the job status	Checking the status of all jobs
8	Inserting the workpiece into the working chamber	Equipping the blank changer and assigning jobs to the positions.
9	Starting the job execution	
10	During job execution: If necessary, change tools manually	

**HINT**

The steps 3–7 in the table above do not have to be executed in the given order. The order was chosen to allow you to execute all steps in the application first and then carry out all manual work at the machine. The following description follows the order given above.

Step 10 is described for all machine types in one single chapter (➔ page 75).

## 17.1 Job execution for machines without blank changer



① To make it easier for you to find the following depicted icons in the job execution view, we have bordered them in different colours. The colours correspond to the ones in the illustration above. Coloured text also refers to the illustration.

- ★ a) You have prepared at least one tool magazine (⇒ page 62).
- b) There are calculated job data available.

If you use FINOCAM, the job data do not have to be calculated completely. The machine can start executing the job already during the calculation. Therefore, FINOCNC offers the jobs for selection already during calculation.

**S 1.** If you use a different CAM application than FINOCAM, import the desired file through the depicted icon.

The icon has to be activated in the application settings (⇒ page 51).

➔ FINOCNC adds the job to the job list [B].

**S 2.** Select the job to execute from the **Job list**.

HINT





**S 3.** In case of a wet grinding job, activate the depicted icon. If a job which requires wet processing is ground without liquid, the tool will break!

➔ FINOCNC automatically controls the water supply during machining.



**S 4.** If you want the machine to clean the coarse dust from the workpiece through compressed air after job completion, activate the depicted icon.

➔ After the spindle has put away the last tool at the end of the job execution, it moves above the workpiece and blows the dust off it with the air nozzles.

**S 5.** In the **Tool magazine** area select a tool magazine that contains all tools required for the job.

If no existing magazine meets this requirement, compile a suitable one (➔ page 62).

**S 6.** Check the job status in the **job list**:



• Green: Machining possible.



• Yellow: The blank is just of sufficient height for the objects. Machining is still possible.



• Rot: Machining is not possible because the currently selected tool magazine does not contain at least one of the required tools.

In this case repeat step 5.

**M 7.** If necessary, equip the tool changer in the CNC machine with the required tools.

You have two choices here:

- You manually insert the tools into the tool changer.
- You equip the tool changer via the spindle. For this you insert the tools into the collet chuck of the spindle. The spindle then puts the tool into the tool changer. You find information about this function in a separate chapter (➔ page 73).

**M 8.** Insert the workpiece into the working chamber of the CNC machine.

How you start the job execution depends on whether you want to execute a single job or whether you want to mill multiple jobs using the same blank:

**S 9. a) You only want to mill or grind the job which you selected in the job list.**



Start the job execution by clicking on the depicted icon.

➔ The machine executes the selected job using the currently inserted workpiece. As soon as the object have been milled or ground the job execution is complete.

**b) You have prepared multiple milling jobs for the same blank. The same workpiece ID is assigned to these jobs.**



Start the job execution by clicking on the depicted icon.

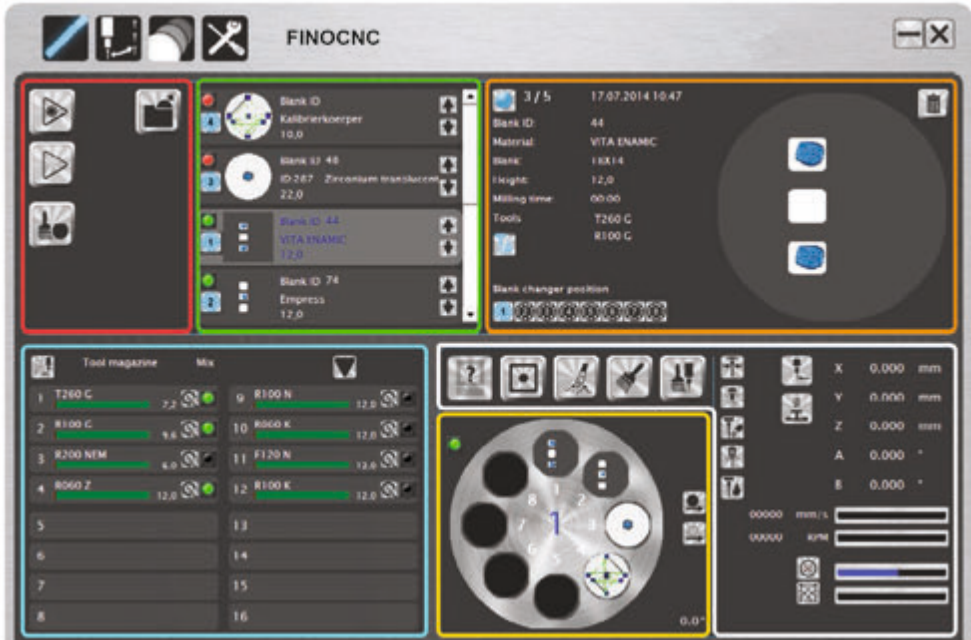
➔ The machine executes all jobs in the **job list** which contain the *same workpiece ID* like the selected job. All objects are created in one blank in succession without any break.

For grinding jobs this function is not available.

① In FINOCAM you can prepare multiple milling jobs for the same blank. You do this especially if you did not make full use of the blank while creating the first job and want to use the remaining free space by creating (➔ page 44).



## 17.2 Job execution for machines with blank changer



① To make it easier for you to find the following depicted icons in the job execution view, we have bordered them in different colours. The colours correspond to the ones in the illustration above. Coloured text also refers to the illustration.

- ★ a) You have prepared at least one tool magazine (↪ page 62).
- b) There are calculated job data available.

If you use FINOCAM, the job data do not have to be calculated completely. The machine can start executing the job already during the calculation. Therefore, FINOCNC offers the jobs for selection already during calculation.

- S 1. If you use a different CAM application than FINOCAM, import the desired file through the depicted icon.

HINT



IMPORTANT

- ➔ The icon has to be activated in the application settings (↪ page 51).
- ➔ FINOCNC adds the job to the **job list** [B].

**S 2.** Specify which jobs you want the CNC machine to execute and which jobs are wet grinding jobs:

- You execute multiple jobs in succession:
  - In the **job list** mark a job.
  - If you want to execute the marked job, activate the check field in the top left corner of the area with the **job details**. Otherwise deactivate the check field.
  - For wet processing activate the depicted icon. If a job which requires wet processing is ground without liquid, the tool will break!
  - Repeat these steps until all jobs are configured as desired.

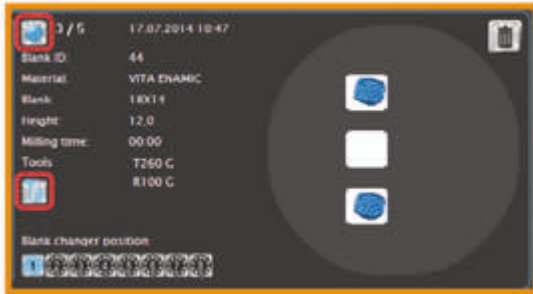


Illustration 48: Area with job details: Check field for activating the job and icon for activating the wet processing marked



- You only execute a single job:
  - Mark the desired job in the **job list**.
  - For wet processing activate the depicted icon in the top left corner of the area with the **job details**. If a job which requires wet processing is ground without liquid, the tool will break!



**S 3.** If you execute multiple jobs in succession:

To adjust the order in which the machine executes the jobs, move the entries in the **job list** through the depicted arrow icons. The jobs are executed from top to bottom.



**S 4.** If you want the machine to clean the coarse dust from the workpiece through compressed air after job completion, activate the depicted icon.

➔ After the spindle has put away the last tool at the end of the job execution, it moves above the workpiece and blows the dust off it with the air nozzles.

**S 5.** In the **Tool magazine** area select a tool magazine that contains all tools required for the job.

If no existing magazine meets this requirement, compile a suitable one (➔ page 62).

**S 6.** Check the job status in the **job list** for all jobs you want to execute:



- Green: Machining possible.
- Yellow: The blank is just of sufficient height for the objects. Machining is still possible.



- Red: Machining is not possible because the currently selected tool magazine does not contain at least one of the required tools. In this case repeat step 5.

**M 7.** If necessary, equip the tool changer in the CNC machine with the required tools.

You have two choices here:

- You manually insert the tools into the tool changer.
- You equip the tool changer via the spindle. For this you insert the tools into the collet chuck of the spindle. The spindle then puts the tool into the tool changer. You find information on this function in a separate chapter (➔ page 73).

**M 8.** Insert the required workpieces into the blank changer of your CNC machine.

**S 9.** Specify in FINOCNC which blank changer positions contain which workpieces and which jobs are assigned to these workpieces.

① The blank changer control for the steps 8 and 9 is complex and is therefore described in a separate chapter (➔ page 70).

How you start the job execution depends on whether you want to execute a single job, or wheter you want to execute multipe jobs via the blank changer.

**S10. a) You only want to mill or grind the job which you selected in the job list:**



Start the job execution by clicking on the depicted icon.

- ➔ The machine only executes the selected job. As soon as the objects are machined the job execution is complete.

**b) You want to execute all activated jobs via the blank changer:**

Start the job execution by clicking on the depicted icon.



- ➔ The machine executes *all activated* jobs using the assigned workpieces. The machine loads the required workpiece frames from the blank changer automatically.

## 17.3 Equipping the blank changer & assigning jobs

You control the blank changer through the blank changer illustration. You assign jobs through the icons for the blank changer positions:

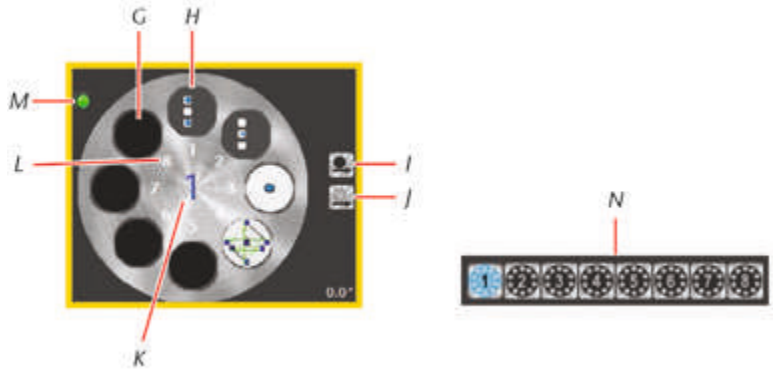


Illustration 49: On the left: blank changer illustration  
On the right: icons for the blank changer positions

- G: Blank changer position with no assigned job  
H: Blank changer position with an assigned job  
I: Load / unload frame  
J: Load / unload frame virtually  
K: Current blank changer position in the working chamber of the CNC machine  
L: Blank changer positions  
M: Icon for the blank changer front cover  
N: Icons for blank changer positions

★ The job execution view displays.

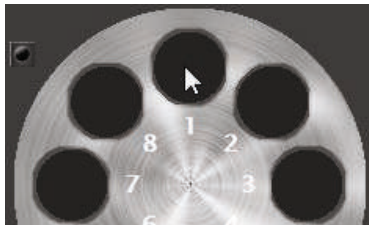
**S 1.** In the blank changer illustration click on the position where you want to insert the workpiece.

➔ **a)** The CNC machine rotates the blank changer until the corresponding clamping lever has reached the frame changing position.

**b)** In the blank changer illustration the corresponding position number displays in green.

### Example

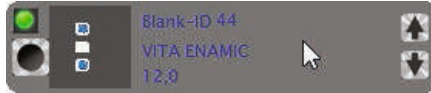
You want to insert the workpiece into position 1, and so you click on this position in the blank changer illustration:



**M 2.** Insert a workpiece into the frame changing position. The operating instructions for the CNC machine describe all necessary steps.

**S 3.** In the job list mark the job which you want to execute using the workpiece that you have just inserted.

*Example* You choose the job with the workpiece ID 44:



**S 4.** Assign the blank changer position chosen in step 1 to the job. To do so, click on the corresponding icon for the blank changer positions [N].

- ➔ FINOCNC assigns the blank changer position to the job:
  - The application inserts a thumbnail of the workpiece into the corresponding blank changer position.
  - In the job list the job is marked with an icon showing the number of the assigned blank changer position.

① You can assign multiple jobs to one blank changer position. You do this especially if you did not make full use of the blank while creating the first job and want to use the remaining free space by creating additional jobs. Read the corresponding information in the FINOCAM section (➔ page 44).

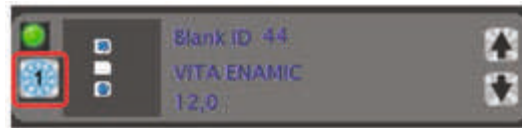
*Example* You assign the position 1 to the job because you inserted the workpiece into this position:



A thumbnail appears in the blank changer illustration at position 1:



In addition, FINOCNC displays the assigned position in the job list:



**S 5.** Repeat steps 1 – 4 until all desired workpieces are inserted into the blank changer and the corresponding jobs are assigned.

You can change the job assignment at any time by repeating steps 3 and 4 for the jobs you want to change.

- ➔ At this point you have equipped the blank changer and assigned all suitable jobs. Now follow the remaining steps for the job execution.

① The following chapter contain information for the advanced control of the blank changer.

**HINT**

### 17.3.1 Loading a workpiece frame into the working chamber

#### IMPORTANT



★ In the blank changer is a workpiece frame that you want to load into the working chamber.

Execute the following two steps in quick succession. If the time period between them is too long, the application interprets step two as a step of its own and rotates the blank changer.

**S 1.** Click on the depicted icon.

**S 2.** In the blank changer illustration click on the position you want to load.

➔ **a)** If there is a workpiece frame currently in the working chamber, the CNC machine unloads it into the corresponding position in the blank changer.

**b)** The CNC machine loads the selected workpiece frame into the working chamber.

**c)** In the middle of the blank changer illustration the number of the selected position displays.

### 17.3.2 Unloading the workpiece frame in the working chamber

#### IMPORTANT

★ In the working chamber of the CNC machine is a workpiece frame that you want to unload into the blank changer.

Execute the following two steps in quick succession. If the time period is too long, the application interprets step two as an individual step and rotates the blank changer.

**S 1.** Click on the depicted icon.

**S 2.** In the blank changer illustration click on the position where you want the workpiece frame to be after unloading.

➔ The CNC machine unloads the workpiece frame into the selected position in the blank changer.

### 17.3.3 Virtually loading and unloading a workpiece frame

With the function “Load/unlock workpiece frame virtually” you change the state of the blank changer in FINOCNC without the CNC machine actually loading or unloading frames. The changes only affect the application.

You use this function when FINOCNC does not reflect the state of the blank changer correctly.

#### Example

According to the application, a workpiece frame is in the workpiece chamber of the machine, while in reality the working chamber is empty. In this case you unload the supposedly inserted workpiece virtually.

#### Loading a workpiece frame virtually

When loading a workpiece virtually, you assign an *empty* blank changer position to the workpiece frame that is currently inserted in the working chamber without the CNC machine actually loading the assigned position.

#### Damaging of the CNC machine in case of an improper assignment of a blank changer position

If you assign a blank changer position with the function “Load/unload workpiece frame virtually“, even though there is already a frame **at the assigned position in the CNC machine**, the frame in the working chamber will collide with the frame in the blank changer when unloaded. This can damage the mechanics of the CNC machine.

- Only load a workpiece frame virtually if there is no frame at the loaded blank changer position in the CNC machine. If necessary, remove the frame from the blank changer.
- ★ a) In the working chamber of the CNC machine is a workpiece frame to which you want to assign a blank changer position.
- b) At the blank changer position that you want to assign is **no** workpiece frame. Execute the following two steps in quick succession. If the time period between them is too long, the application interprets step two as a step of its own and rotates the blank changer.

**IMPORTANT**



- S 1. Click on the depicted icon.
- S 2. In the blank changer illustration click on the position to which you want to assign the workpiece in the working chamber.
- ➔ In the middle of the blank changer illustration the number of the selected position displays. The axes of the CNC machine do not move.

**Unloading a workpiece frame virtually**

When unloading a workpiece virtually, you set the status of the working chamber in FINOCNC to „empty“ without the CNC machine unloading it.

**Damaging of the CNC machine in case of an improper virtual unloading of the working chamber**

If there is still a workpiece frame in the working chamber after virtual unloading and a new frame is loaded from the blank changer, both frames will collide: As the CNC machine does not unload the frame in the working chamber, the frame will crash into the frame that is supposed to be loaded. This can damage the mechanics of the CNC machine.

- **Before** unloading a workpiece frame virtually, always remove the workpiece frame from the working chamber of the CNC machine.
- ★ a) There is **no** workpiece frame in the workpiece chamber of the CNC machine.
- b) In the middle of the blank changer illustration FINOCNC displays the workpiece frame number which is supposedly inserted in the working chamber of the CNC machine.

- S Click on the depicted icon.
- ➔ FINOCNC removes the number of the selected position from the middle of the blank changer illustration. *For the application* the working chamber of the machine is now empty. The axes of the CNC machine do not move.

**NOTICE**



**17.4 Equipping the tool changer via the spindle**

In the job execution view you can equip the tool changer of your CNC machine via the spindle. During this process you insert the tools into the collet chuck of the spindle, which then puts them into the tool changer.

Tools which may be already inserted in the tool changer, may remain at the corresponding positions. They will automatically be removed during the process.

- ★ a) The job execution view displays.
- b) You have selected a tool magazine which contains the tools that you want to equip the tool changer with.

- S 1. In the **Tool magazine** area click on the depicted icon.
- ➔ The **Equip tool changer** window opens.





Illustration 50: The window for equipping the tool changer with 5 positions

The window shows the tools in the selected tool magazine with the corresponding position numbers.

**S 2.** For each tool which you do *not* want to equip, deactivate the corresponding check field. If you want to equip a tool, activate the corresponding check field.

① The positions will be equipped in the order of their position numbers.

**S 3.** Click on the depicted icon.

- ➔ a) The spindle moves to the first selected position in the tool changer and removes a possibly inserted tool.
- b) The spindle moves into the tool changing position.
- c) FINOCNC asks you to confirm the opening of the collet chuck.



### CAUTION

#### Danger of cuts when touching the tool

If you touch the tool at the cutting edge, you may get cut.

- Only touch the tool at the shank.
- Wear gloves to protect your hands.

### NOTICE

#### Dropping and damaging of the tool

As long as the collet chuck is open, the tool may drop and be damaged.

- Hold the tool with your hand as long as the collet chuck is open.

**M 4.** Open the front cover and hold a tool that may be inserted in the collet chuck with your hand.

**S 5.** In the current confirmation window click on the depicted icon.

- ➔ a) The collet chuck opens.
- b) In a new window FINOCNC asks you to insert the first tool into the collet chuck.

**M 6.** If necessary, remove the inserted tool.

**M 7.** Insert the required tool into the collet chuck and hold it.

**S 8.** In the current confirmation window click on the depicted icon.

- ➔ a) The collet chuck closes.
- b) The current window closes.
- c) A new confirmation window opens.







**M 9.** Close the front cover.

**S10.** In the current confirmation window click on the depicted icon.

- ➔ The spindle puts the tool into the corresponding tool changer position. As long as you have selected at least one other tool in step 2, the process repeats from the *result* of step 3.

**S11.** Repeat the steps 6 – 12 until all selected tools have been inserted into the tool changer.

- ➔ The **Equip tool changer** window closes.

## 17.5 Changing tools manually during job execution

If you have configured a manual tool change for some tool changer positions, you have to insert the corresponding tools manually into the collet chuck of the spindle during job execution.

- ★ **a)** The spindle has put away the last used tool and has moved to the tool changing position.
- b)** In a window FINOCNC asks you to insert the tool into the collet chuck.



**S 1.** To confirm the message, click on the depicted icon.

- ➔ The collet chuck opens. In a new window FINOCNC asks you to insert the tool into the collet chuck.

 **CAUTION**

### Danger of cuts when touching the tool

If you touch the tool at the cutting edge, you may get cut.

- Only touch the tool at the shank.
- Wear gloves to protect your hands.

**NOTICE**

### Dropping and damaging of the tools

As long as the collet chuck is open, the tool may drop and be damaged.

- Hold the tool with your hand as long as the collet chuck is open.

**M 2.** Open the front cover.

**M 3.** Insert the required tool into the collet chuck and hold it.

**S 4.** In the current confirmation window click on the depicted icon.



- ➔ **a)** The collet chuck closes.
- b)** The current window closes.
- c)** A new confirmation window opens.

**M 5.** Close the front cover.

**S 6.** In the current confirmation window click on the depicted icon



- ➔ The CNC machine continues the job execution.

## 17.6 Deleting jobs

★ The job execution view displays.

**S 1.** In the job list mark the job you want to delete.

**S 2.** In the area with the job details click on the depicted icon in the top right corner.

**S 3.** Confirm the security prompt in the window that opens.

**S 4.** FINOCNC deletes the job from the job list immediately.



## 18 Controlling individual machine functions

Through several icons in the job execution view as well as the machine control view, you can send individual commands directly to the CNC machine.

In both of the mentioned views the icons and their functions are identical, only their position is different.

**S** To call up the job execution view, click on the depicted icon in the icon bar.

➔ The job execution view displays.

**S** To call up the machine control view, click in the icon bar on the depicted left icon and then in the lower icon bar on the depicted right icon.

➔ The machine control view displays.

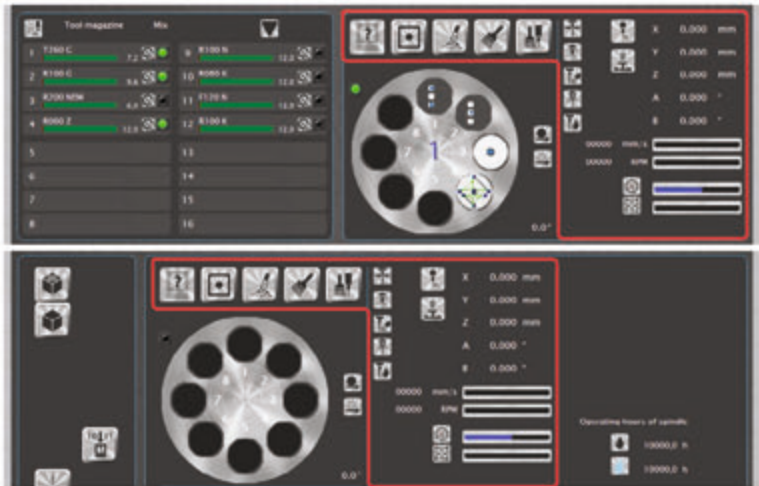


Illustration 51: Top: job execution view (part),

Bottom: machine control view (part)

Icons for machine control marked in each view

The machine control commands described here are meant for machine maintenance and testing. You cannot execute jobs manually with them. During job execution FINOCNC controls all functions automatically.

### The machine control icons

The following icons types are used in the area for machine control:

① To differentiate between the individual icon types, we have marked the icons in this chapter with coloured lateral lines. The colours correspond to the ones in the following list.

- **Standard icons**  
Click on them to call up the corresponding function.
- **Toggle icons**  
Click on them to toggle between the activated and deactivated function. Also indicate the current state.
- **Indicator icons**  
Indicate the current state of the function. You cannot influence the state through these icons.

On the user interface the icons can be coloured in two different ways:

- Black icon: Function is deactivated
- Blue icon: Function is activated



### CNC machine status

This icon changes its appearance depending on the status of the CNC machine:

Icon	Meaning	Explanation
	No connection	FINOCNC was not able to establish a connection to the CNC machine. Check the cable connections and whether the machine is switched on.
	Connected	FINOCNC has found a supported machine which it can control.
	Front cover open	The front cover of the CNC machine is open. Many functions are not available due to safety reasons including the job execution.
	Machine is running	The machine is currently executing commands (e. g. executing a job).
	Machine stand-still	The user has brought the machine to halt via FINOCNC.
	Machine is waiting	The CNC machine is waiting for job data from FINOCAM.
	Emergency stop activated	A machine parameter reached a critical value, which caused the emergency stop to trigger. <b>Contact customer service.</b>



### Move to default position

The CNC machine moves the workpiece holder into the default position. This enables you to do the following:

- Insertion of a workpiece frame into the working chamber or the blank changer or the removal of a frame.
- Equipping the tool changer.



### Activate/deactivate the air extraction

Through this icon you activate or deactivate the air extraction in the working chamber of the CNC machine. The installation of the vacuum cleaner is described in the operating instructions of your CNC machine.



### Clean working chamber

The CNC machine moves the workpiece holder into a position which makes cleaning the working chamber easier. If you click on the icon while the workpiece holder already is in the cleaning position, it moves back to the default position.



### Release tool and/or maintenance spindle

The spindle moves into the tool changing position and, after confirmation in FINO-CNC, opens the collet chuck.



**CAUTION**

### Danger of cuts and burns when touching the tool

If you touch the tool at the cutting edge, you may get cut. As the tool can be very hot, you may also suffer from skin burns.

- Only touch the tool at the shank.
- Wear gloves to protect your hands.

**NOTICE**

### Dropping and damaging of the tool

As long as the collet chuck is open, the tool may drop and be damaged.

- Hold the tool with your hand as long as the collet chuck is open.

You can manually remove the tool when collet chuck is open.

In this position you also can maintain the clean the spindle easily. You find further information on how to clean and maintain the spindle in the operating instructions for your CNC machine.

If you click on the icon while the spindle is in the tool changing position, it moves back to the default position.



### Collet chuck open/close

Through this icon you open and close the collet chuck. You can then remove an inserted tool and/or insert a new one.



**CAUTION**

### Danger of cuts and burns when touching the tool

If you touch the tool at the cutting edge, you may get cut. As the tool can be very hot, you may also suffer from skin burns.

- Only touch the tool at the shank.
- Wear gloves to protect your hands.

**NOTICE**

### Dropping and damaging of the tool

As long as the collet chuck is open, the tool may drop and be damaged.

- Hold the tool with your hand as long as the collet chuck is open.



**Activate/deactivate sealing air**

Through this icon you activate or deactivate the sealing air. The sealing air prevents chips from entering the spindle during job execution.



**Activate/deactivate air nozzles**

Through this icon you activate or deactivate the air nozzles. They are aimed at the workpiece and remove chips from it during job execution.



**Activate/deactivate cone cleaning**

Through this icon you activate or deactivate the compressed air for cone cleaning. It is blown through the opened collet chuck during tool changing to remove chips from the tool.



**Activate/deactivate liquid supply**

Through this icon you activate or deactivate the liquid supply for wet processing.

When using the optional wet grinding module, you should use this function right after the first installation of the module to remove air from the system and to unlock a module that you added retroactively (➔ page 57).

ⓘ [A wet grinding module that was delivered with your CNC machine is already unlocked for this machine.](#)



**Mass contact of the spindle**

This icon indicates that the inserted tool or measuring pin has contact to a grounded surface e.g. during calibration. This information is meant for service technicians in the first place.



**Tool measuring key**

This icon indicates that the inserted tool has contact to the tool measuring key during tool length measurement or tool breakage monitoring.



**Pressure sensor**

This icon indicates that the compressed air which is supplied to the CNC machine is sufficient.

The value bar right of the icon shows the height of the air pressure. The longer the bar, the higher the air pressure.



**Vacuum in working chamber**

This icon indicates that the vacuum in the working chamber of the CNC machine is sufficient. If this is not the case, check whether the vacuum cleaner is properly installed and operational. Without a sufficient vacuum, the machine will not execute any jobs.

The value bar right of the icon shows the vacuum strength. The longer the bar, the stronger the vacuum.

## Non graphical information in the area for machine commands

You also find the following textual information in the area for individual machine commands:

- **X, Y, Z & <value> mm**  
The current position of the corresponding axis in millimeters.
- **A, B & <value> °**  
The current angle of attack of the A and B axis in degrees.
- **<value> mm/s**  
The current feedrate of the axes in millimeters per second.
- **<value> RPM**  
The current rotational speed of the spindle (RPM=rotations per minute)

## 19 Maintaining the CNC machine

### 19.1 Milling calibration and test specimens

With test and calibration specimens you can measure and, under certain conditions, improve the machining results of the CNC machine:

- With calibration specimens you determine the deviation of the CNC machine *without* any error compensation by the application. When the deviation is too high, FINOCNC tries to use the determined results to improve the precision of the CNC machine through error compensation.
- With test specimens you test the precision of the CNC machine *with* the error compensation currently stored in FINOCNC.

Usually you test and calibrate the machine in three steps:

1. You mill a test specimen and measure it. If the measured values lie outside the range of tolerance, you proceed with step 2.
2. You mill a calibration specimen and enter the measured values in FINOCNC. The application uses the data for an automatic error compensation.
3. You mill an additional test specimen to check whether the calibration has improved the precision of the machine sufficiently. If not, contact customer service.

#### 19.1.1 Milling a calibration specimen and storing the error compensation

You received a calibration set with your CNC machine. From this set you require the following items for calibration:

- A calibration blank
- The milling tool designated for calibration
- The micrometer

A calibration is handled almost like a usual job in FINOCNC. The differences:

- You create the job in the machine control view.
- After job execution and measuring the milled calibration specimen you enter the measured values in a special window which FINOCNC opens automatically.

**NOTICE**

**Deterioration of machining results caused by an incorrect calibration**

The machine is already calibrated when delivered. As long as your machining results are without flaw, a new calibration is not necessary. A calibration takes much time and can deteriorate the machining results in the worst case, if it is not done correctly.

- In case of inaccurate machining results try adjusting the working conditions first: Check the fixation of the workpiece, the state of the tool or of the processing material.
- Before calibrating the machine, contact customer support.
- Be very careful when measuring and entering data during calibration. When in doubt, stop the calibration.

You calibrate your CNC-Maschine as follows:

- M 1.** Insert the calibration blank into the machine and equip the tool changer with the tool from the calibration set.
- S 2.** In the icon bar click on the depicted left icon and then in the lower icon bar on the depicted right icon.
  - ➔ The machine control view displays.
- S 3.** In the top left corner click on the depicted icon.
  - ➔ The job execution view displays. FINOCNC adds the job for milling the calibration specimen to the job list.
- S 4.** Make sure that a tool magazine exists which contains the tool you inserted in step 1. You find the exact tool name on the right hand side in the area with the job details beside the text **Tools**.
- S 5.** Follow the instructions for executing jobs and machine the calibration specimen (➔ page 63).
  - ➔ The CNC machine mills the job. The **Mill calibration specimen** window opens.

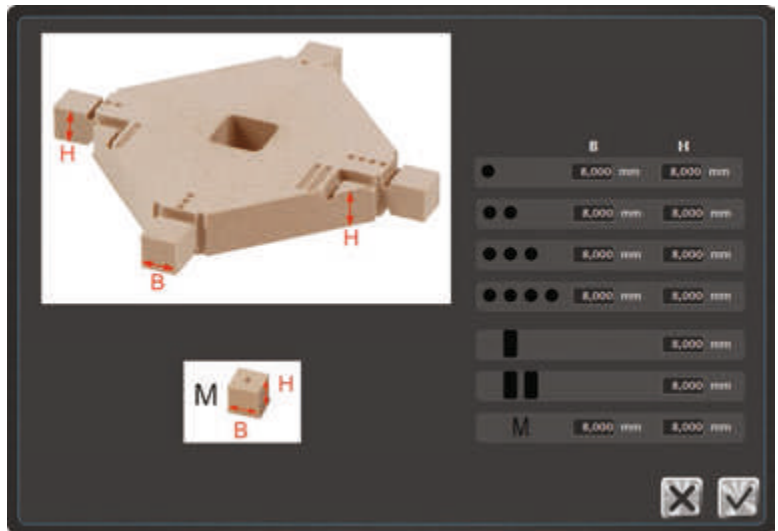
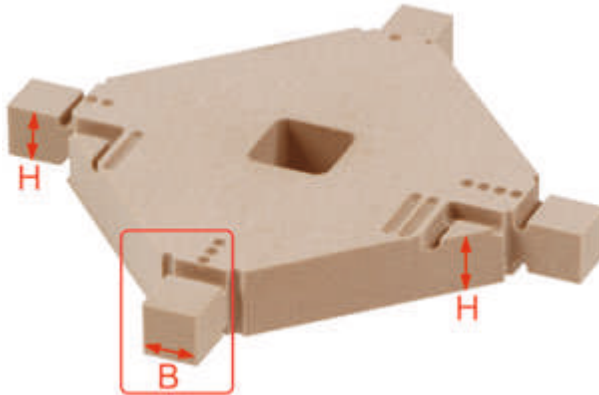


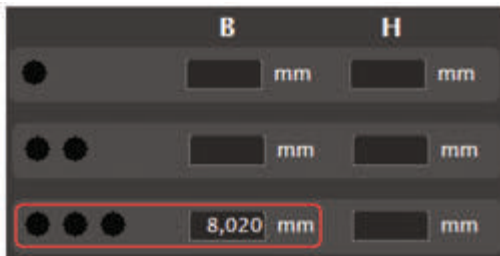
Illustration 52: The window for entering the calibration values with sample data

- M 6.** Remove the milled blank and measure it with the micrometer. Measure each spot twice to make sure that the measured values are indeed correct.
- Every spot you need to measure is marked on the blank with symbols (●/■).
  - You measure the height as well as the width of every spot with a ● symbol and of the cube in the blank centre. You only measure the height of the spots with a ■ symbol.
- S 7.** Enter the measured values in the **Mill calibration specimen** window *very carefully*. Incorrect values can lead to an incorrect error compensation which will strongly deteriorate the machining results.
- The symbols in the table next to the input fields are identical to the ones on the blank.
  - In addition, the table is divided into columns for the width (**B**) and the height (**H**).
  - On the basis of the symbols and the column headings **H** and **B** you know which measured value belongs into which field of the table.

*Example* You measure the width of position ●●●.



You measure a width of 8.020 mm. You enter this value into the field next to the ●●● symbol in the column B.



- S 8.** After entering all values, confirm your input by clicking on the depicted icon. In the following security prompt, click on the icon again.
- ➔ From now on FINOCNC applies an error compensation during job execution on the basis of the entered values.



### 19.1.2 Milling a test specimen and measuring it

You received a calibration set with your CNC machine. This set is also used for milling and measuring a test specimen. You require the following items from this set:

- A calibration blank
- The tool designated for calibration
- The micrometer

You mill a test specimen as follows:

**M 1.** Insert the calibration blank into the machine and equip the tool changer with the tool from the calibration set.

**S 2.** In the icon bar click on the depicted left icon and then in the lower icon bar on the depicted right icon.

➔ The machine control view displays.

**S 3.** In the top left corner click on the depicted icon.

➔ The job execution view displays. FINOCNC adds the job for milling the test specimen to the job list.

**S 4.** Make sure that a tool magazine exists which contains the tool you inserted in step 1. You find the exact tool name on the right hand side in the area showing the job details beside the text **Tools**.

**S 5.** Follow the instructions for executing jobs and machine the test specimen (➔ page 63).

➔ The CNC machine mills the job.

**M 6.** Remove the milled blank and measure it with the micrometer. Measure each spot twice to make sure that the measured values are indeed correct.

- Every spot you need to measure is marked on the blank with symbols (●/■) (➔ Illustration 52 on page 81).
- You measure the height as well as the width of every spot with a ● symbol and of the cube in the blank centre. You only measure the height of the spots with a ■ symbol.
- The measured values at all spots should be between 7.950 mm and 8.050 mm.

➔ If all measuring spots are within the range of tolerance, you do not need to calibrate the CNC machine.

Deviations can be caused by the current working conditions: Check the fixation of the workpiece and the state of the tool.



**IMPORTANT**

### 19.2 Drilling tool positions

If the tool changer inserts are worn, you replace them with new ones. Then you drill the tool positions into the new inserts with the CNC machine. For this have the special tool (drill with 2.8 mm diameter) ready that came with the CNC machine.

★ The spindle is in default position (➔ page 78).

**M 1.** Replace the worn tool changer inserts with new ones and close the front cover of the CNC machine.

**S 2.** In the icon bar click on the depicted icon on the left and then in the lower icon bar on the depicted icon on the right.

➔ The machine control view displays.





- S 3.** In the left column click on the depicted icon.  
 ➔ The **Drill tool changer inserts** window displays.

① You can pause the drilling of the tool changer inserts at any time by clicking on the depicted icon. In the window which then opens you can either continue the process or cancel it completely.



- S 4.** In the Drill tool changer inserts window click on the depicted icon.  
 ➔ a) The spindle moves to tool changing position.  
 b) The collet chuck opens.  
 c) FINOCNC asks you to insert the tool in a new window.

**CAUTION**

**Danger of cuts and burns when touching the tool**

If you touch the tool at the cutting edge, you may get cut.

- Only touch the tool at the shank.
- Wear gloves to protect your hands.

**NOTICE**

**Dropping and damaging of the tool**

As long as the collet chuck is open, the tool may drop and be damaged.

- Hold the tool with your hand as long as the collet chuck is open.

- M 5.** Insert the required tool into the collet chuck and hold it.

- S 6.** In the current confirmation window click on the depicted icon.

- a) The collet chuck closes.
- b) The current window closes.
- c) A new confirmation window opens.

- S 7.** In the current confirmation window click on the depicted icon.

- ➔ The CNC machine waits for you to close the front cover.

- M 8.** Close the front cover.

- S 9. a)** The CNC machine drills the tool changer positions.

- b) The application indicates the progress through text messages in the **Drill tool changer inserts** window.

- c) After completion the spindle moves into the tool changing position.

- d) FINOCNC offers in a new window to open the collet chuck to remove the tool.

**CAUTION**

**Danger of cuts and burns when touching the tool**

If you touch the tool at the cutting edge, you may get cut. As the tool can be very hot, you may also suffer from skin burns.

- Only touch the tool at the shank.
- Wear gloves to protect your hands.

**NOTICE**

**Dropping and damaging of the tool**

As long as the collet chuck is open, the tool may drop and be damaged.

- Hold the tool with your hand as long as the collet chuck is open.

- S10.** In the current window click on the depicted icon.

- ➔ a) The collet chuck opens.  
 b) A new window opens where you need to confirm the removal of the tool.

- M11.** Remove the tool.

- M12.** Close the front cover.

- S13.** In the current confirmation window click on the depicted icon.

- ➔ The spindle moves into the default position.

### 19.3 Updating the firmware of the CNC machine

The firmware is the internal control software of your CNC machine. New versions may introduce new functions and improve existing ones. You receive new firmware versions on the following ways:

- Together with new versions of FINOCNC. Obtain them regularly.
- As a separate file from customer service.

➤ Always install the newest firmware version as soon as you receive it.

#### **Damaging of the control unit when a firmware update is interrupted**

If the firmware update is interrupted, for example by a power outage, disconnecting the USB connection between the computer and the CNC machine, closing of FINOCNC by the user etc., the control unit of the machine may take permanent damage.

- Only update the firmware when a permanent electrical supply of the machine and the computer is guaranteed.
- Only update the firmware if the computer runs stably and is free of malware.
- Do not disconnect the CNC machine or the computer from the electrical source and do not switch off the machine or the computer during an update.
- Do not close FINOCNC during an update.

#### **Installing the firmware through the internal update function**

Whenever you execute a job, FINOCNC displays a notice if the embedded firmware is newer than the one on the connected CNC machine. In this message window the application also asks you if you want to install the new version.

**S** To install a firmware embedded within FINOCNC, click on the depicted icon in the mentioned message window.



#### **Updating the firmware as a separate file**

If you received the firmware as a separate file, install it as follows:

**S 1.** In the icon bar click on the depicted icon on the left and then in the lower icon bar click on the depicted icon on the right.

➔ The machine control view displays.

**S 2.** In the left column click on the depicted icon.

➔ The **Firmware update** window displays.

**S 3.** In the **Firmware update** window click on the depicted icon.

➔ The window for file selection opens.

**S 4.** Select the firmware file you want to import.

➔ FINOCNC displays the path and the name of the selected firmware file in the **Firmware update** window.

**S 5.** Click on the depicted icon.

➔ FINOCNC updates the firmware on the connected CNC machine.



**NOTICE**

## 20 Retrieving application and machine data

### 20.1 Viewing the job log and restoring jobs

The job log shows the jobs executed in FINOCNC. Beside general job data it also contains information about errors that may have occurred. In addition, you can restore jobs to execute them again.



- S** In the icon bar click on the depicted icon.  
➔ The job log view displays.

The log contains the following columns:

- **ID**  
A unique number for the job within the log.
- **Error code**  
If the job was not executed correctly, the reason is stated here. You find an overview of possible entries at the end of this list.  
The text **IO** in this column indicates that the job was executed correctly.
- **Start**  
Date and time when the job execution was started.
- **End**  
Date and time when the job execution ended.
- **Duration**  
Duration of the job execution in the format <hours:minutes>.
- **Material**  
The material processed for the job.
- **Dimensions**  
The dimensions of the processed workpiece.
- **Height**  
The height of the workpiece.

Possible **error codes** in the Error code column:

Error code	Description
<b>Cancelled by user</b>	The user cancelled the job execution via FINOCNC.
<b>COM port disconnection</b>	The connection to the CNC machine got interrupted during job execution.
<b>Error while reading NC data</b>	FINOCNC could not read the file with the calculated job data and therefore could not execute the job.
<b>Emergency stop activated</b>	The job was stopped by activating the emergency stop.
<b>Tool not available</b>	At least one required tool was not available in the tool changer.
<b>Tool breakage</b>	During job execution a tool broke.

### Restoring jobs

If you want to execute a job listed in the log again, you restore it. This way, you do not need to re-import the job or even re-create it in FINOCAM.

You can only restore jobs whose data are still stored on the computer. You specify the maximum duration of data storage in the application settings (⇒ page 51).

**IMPORTANT**



**S 1.** Mark the desired job in the log.

**S 2.** Click on the depicted icon.

➔ If the job data are still stored on the computer, a confirmation window opens. Otherwise you receive a message that the job cannot be restored.

**S 3.** In the confirmation window click on the depicted icon.

➔ **a)** he job execution view displays.

**b)** FINOCNC adds the selected job to the job list.

**c)** FINOCNC removes the job from the log.

You execute the job as usual (⇒ page 63).

## 20.2 Retrieving and exporting the machine geometry

You retrieve the machine geometry values in the machine geometry view. There you can also export them into a text file. These data are usually only needed by customer support and service technicians and therefore are not described here in detail. By exporting them into a file you can send them to customer support e.g. by email.

**S 1.** In the icon bar click on the depicted icon on the left and then in the lower icon bar click on the depicted icon on the right.

➔ The machine geometry view displays.



**Axis measurement** 07.12.2012 13:32:10  
Measuring the tool changer 07.12.2012 12:51:50

Machine type 551  
Number of control unit 2015  
Wet grinding module unlocked

Zero point of the	ZP axes	92,331	48,668	36,106	80,114	29,414
ZP Blank		92,400	49,036	36,120	80,114	29,430

Position of measuring stylus z		11,318	48,650	39,679	80,104	29,406
Position of rotary axes	V		-0,000053			
	H		-0,001368			
Angle error XY				0,000126		

Positions of tools					
T01	12,318	3,650	43,522	80,104	29,406
T02	12,318	11,650	43,522	80,104	29,406
T03	12,318	19,650	43,522	80,104	29,406
T04	12,318	27,650	43,522	80,104	29,406
T05	12,318	35,650	43,522	80,104	29,406
T06	12,318	43,650	43,522	80,104	29,406
T07	12,318	51,650	43,522	80,104	29,406
T08	12,318	59,650	43,522	80,104	29,406
T09	4,318	3,650	43,522	80,104	29,406
T10	4,318	11,650	43,522	80,104	29,406
T11	4,318	19,650	43,522	80,104	29,406
T12	4,318	27,650	43,522	80,104	29,406
T13	4,318	35,650	43,522	80,104	29,406
T14	4,318	43,650	43,522	80,104	29,406
T15	4,318	51,650	43,522	80,104	29,406
T16	4,318	59,650	43,522	80,104	29,406

Switching threshold pressure sensor 0

Illustration 53: The machine geometry view, areas with geometry data marked in red



### Exporting geometry data into a text file

**S** Click on the depicted icon.

➔ FINOCNC writes the geometry data into the installation folder under the file name **CNCStatus.txt**.

### Additional function in the machine geometry view

The following functions are also available in the machine geometry view. They are described elsewhere in these instructions for use:

- **Unlocking a wet grinding module for the CNC machine**

If you added the optional wet grinding module to an existing CNC machine, you have to unlock it for the machine once before the first use (➔ page 57).

- **Configuring a manual tool change for individual tool changer positions**

If you want to change tools on specific positions manually, you specify this in the Positions of tools area (➔ page 56).

## 20.3 Retrieving the operating hours of the spindle

The CNC machine stores the operating hours of the spindle separately for dry and wet processing. Depending on the capabilities of your machine, you can view one or both of these values in FINOCNC:

**S 1.** In the icon bar click on the depicted icon on the left and then in the lower icon bar click on the depicted icon on the right.

➔ The machine control view displays.

In the right area of the view the current operating hours display next to the text **Operating hours of spindle**. The two values are labelled by the following icons:

- Left icon: Operating hours for dry processing
- Right icon: Operating hours for wet processing

ⓘ **If your machine cannot operate in one of these modes, the corresponding value does not display.**



## 20.4 Retrieving dongle data

If you or customer support require the data stored on the dongle, you retrieve them as follows:

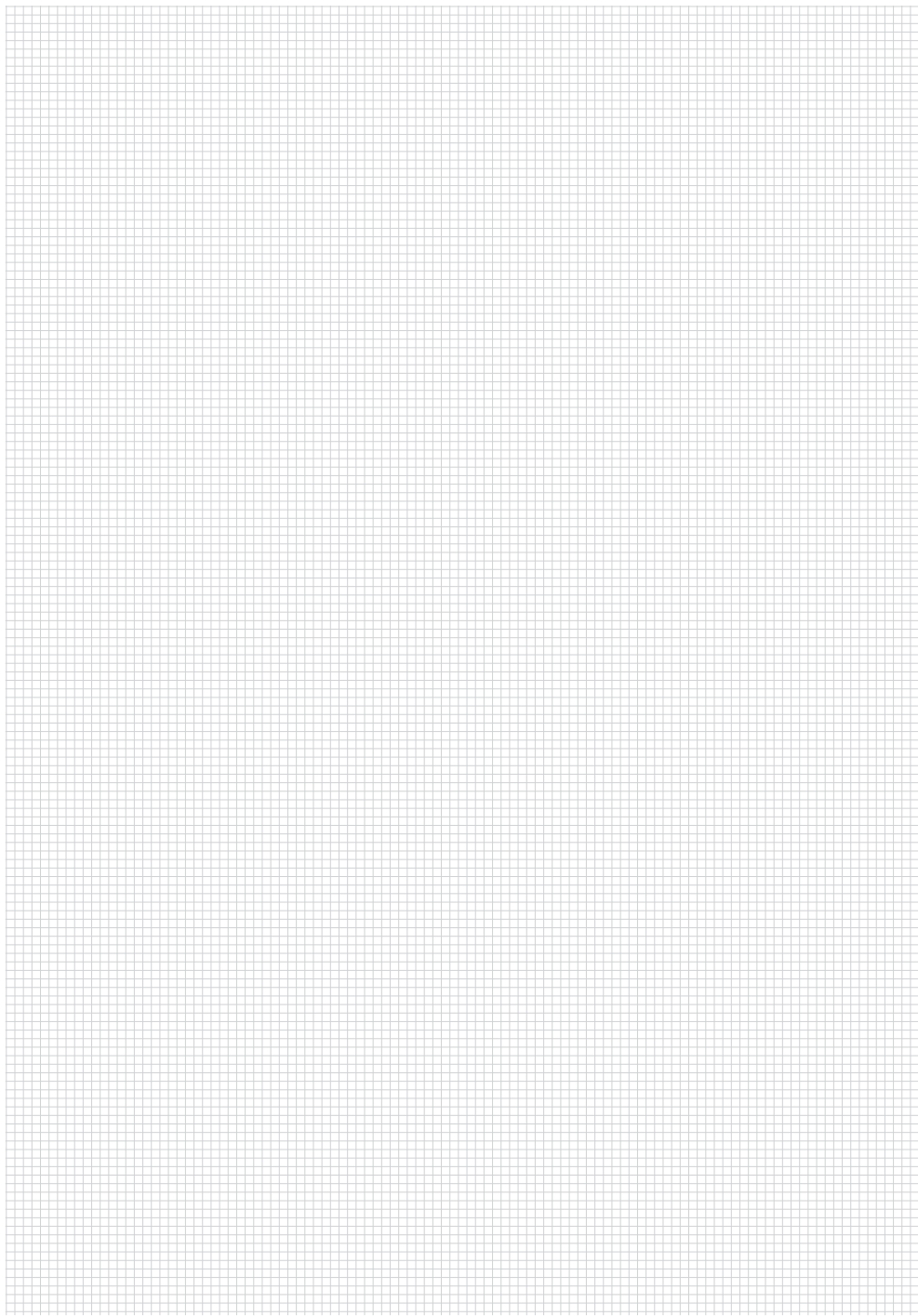
**S 1.** In the icon bar click on the depicted icon on the left and then in the lower icon bar click on the depicted icon on the right.

➔ The machine control view displays.

**S 2.** In the left column click on the depicted icon.

➔ The **Display dongle data** windows opens.





## 21 Index

5-axis release .....31

### A

Administrated Tool Board.....61  
Air extraction when opening the front cover .....54  
Angle undercuts on outer surfaces.....31  
Application data retrieval. *See* Data retrieval

Application settings

    FINOCAM.....17  
    FINOCNC.....51

Archive folder .....22

### B

Bars

    calculations.....20  
    finishing type.....40, 44  
    move horizontally.....41  
    move vertically.....41  
    remove.....44  
    set.....40

Blank changer

    control.....70  
    equip.....70  
    execute jobs.....67

Buttons .....5

### C

Calculation

    individual jobs .....46  
    multiple jobs.....44

CAM setup program .....8

Cavity .....19

Check fields/check boxes .....6

Cleaning reminder.....53

CNC machine maintenance

    calibration specimen.....80  
    error compensation .....83  
    test specimen.....83  
    tool positions.....83

Color of workpieces.....23

Comments

    enter .....24  
    search.....26

Concept

    FINOCAM.....15  
    FINOCNC .....50

Configuration

    FINOCAM.....17  
    FINOCNC.....51

Control elements .....5

Core applications .....9

C++ runtime environment .....12

### D

Data retrieval

    job log.....87  
    machine geometry.....87  
    operating hours of the spindle.....89

Data transfer settings .....22

Desktop icon.....10

Diameter of node .....20

DirectMill .....22

Divergent insertion vectors .....17, 32

Dongle

    data retrieval .....89  
    installation .....8

Drillings .....17, 19, 32

Drops

    diameter .....21  
    removal .....44  
    set.....39, 44

Duration of job data storage .....53

### E

Empty areas

    edit .....45  
    lock.....45  
    unlock .....45

Energy saver settings.....8

Error messages

    job calculation .....48  
    job log.....86

Excel.....46, 48

Export: machine geometry data.....87

### F

Filter workpiece archive .....26

Finishing type for bars.....40, 41

Firmware update .....85

Folder settings

    CAM data .....53  
    object data.....23

Fresh installation .....8



<b>G</b>		
General settings		
FINOCAM.....	17	
FINOCNC.....	51	
Geometry data		
export.....	87	
retrieve.....	87	
<b>H</b>		
Hardware requirements.....	8	
Height		
sinter bars.....	30	
sinter plates.....	30	
workpieces.....	23	
<b>I</b>		
Icon bar		
FINOCAM.....	16	
FINOCNC.....	50	
Icons		
CAM data import.....	53	
import options.....	33	
use.....	5	
ID numbers		
assignment.....	23	
search/filter.....	25	
Import options		
activate/deactivate.....	31, 32	
change for objects on the import list.....	33	
icons overview.....	33	
Individual jobs: calculate.....	46	
Individual machine functions.....	76	
Individual processing.....	21	
Input fields.....	5	
Insertion vectors.....	17	
Installation		
Core applications.....	9	
folder.....	9, 10	
preparation.....	8	
runtime environment for C++.....	12	
Setup program.....	8	
STL viewer.....	10	
USB driver.....	11	
Instructions for use		
safety notes: structure.....	4	
symbols.....	4	
use.....	4	
		Intended use
		FINOCAM.....
		FINOCNC.....
		15
		50
<b>J</b>		
Jobs		
blank changer positions.....	70	
calculate individually.....	46	
calculate multiple.....	47	
create.....	23	
data source.....	53	
delete in FINOCAM.....	39	
delete in FINOCNC.....	76	
duration of data storage.....	53	
edit.....	23	
error codes.....	87	
execute.....	63	
execute with blank changer.....	67	
log.....	86	
restore via the log.....	87	
<b>L</b>		
Language selection		
FINOCAM.....	17	
FINOCNC.....	52	
installation.....	9	
Lot number.....	24	
<b>M</b>		
Machine data. <i>See</i> Data retrieval		
Machine maintenance. <i>See</i> CNC machine maintenance		
Machine type.....	17	
Machining sequence.....	38	
Manual tool change.....	56	
Mark blank positions.....	45	
Materials		
activate for wet grinding module.....	17	
select for workpiece.....	23	
Maximum operation hours of tools.....	56	
Microsoft Excel.....	46, 48	
Milling cutter.....	19	
Multi-job calculation.....	46	
<b>N</b>		
Nesting view.....	35	

<b>O</b>	
Objects	
add to import list.....	33
delete from import list.....	33
move in the workpiece .....	36
move vertically.....	29
place.....	35
remove .....	39
rotate .....	36
select type.....	31
Opening angle.....	19
Operating system .....	8
Operation hours	
spindle .....	89
tools.....	63
Optional tools .....	19
Option fields .....	6
Outer surfaces .....	17
Oversize of fits .....	20
Overview of processing statuses .....	38
<b>P</b>	
Parallel processing .....	21
Precision of objects .....	31
Press down function for tools.....	56
Preview of STL files.....	29
Processing quality .....	31
Processing settings in FINOCAM.....	15
Processing status .....	38
Program changes .....	13
<b>Q</b>	
Quality of objects .....	31
<b>R</b>	
Radius cutter/flat ground cutter .....	20
Reducing remaining areas .....	20
Release notes .....	13
Roughing .....	20
Runtime environment for C++.....	12
<b>S</b>	
Safety distances for grinding blocks .....	37
Scaling of objects .....	23
Search	
comments .....	26
divergent insertion vectors .....	32
drillings.....	32
Selection lists .....	5
Sequence optimization .....	21
Settings	
FINOCAM.....	17
FINOCNC.....	51
Sinter bars	
height .....	31
set .....	30
width.....	31
Sinter plates	
height.....	30
set .....	30
Snap-to placement aid .....	37
Source of job data .....	53
Status of calculated objects .....	19
STL data	
import .....	26
preview.....	29
viewer .....	10
<b>T</b>	
Test specimen. <i>See</i> CNC machine maintenance: test specimen	
Text fields.....	5
Tool changer	
drill positions.....	83
use spindle to equip .....	73
Tool positions: drill.....	83
Tools	
Administrated Tool Board.....	61
cards.....	60
data retrieval .....	55
forms.....	54
magazines.....	59, 62
manual change .....	75
maximum operation hours .....	56
names .....	54
press down function .....	56
rings.....	54
stock .....	59, 60, 61
suitability for materials.....	54
tool life: reset .....	63
tool life: specify .....	56

Tool type	
suitability for materials .....	54
Tool types	
name structure .....	54
Type of objects.....	31

## U

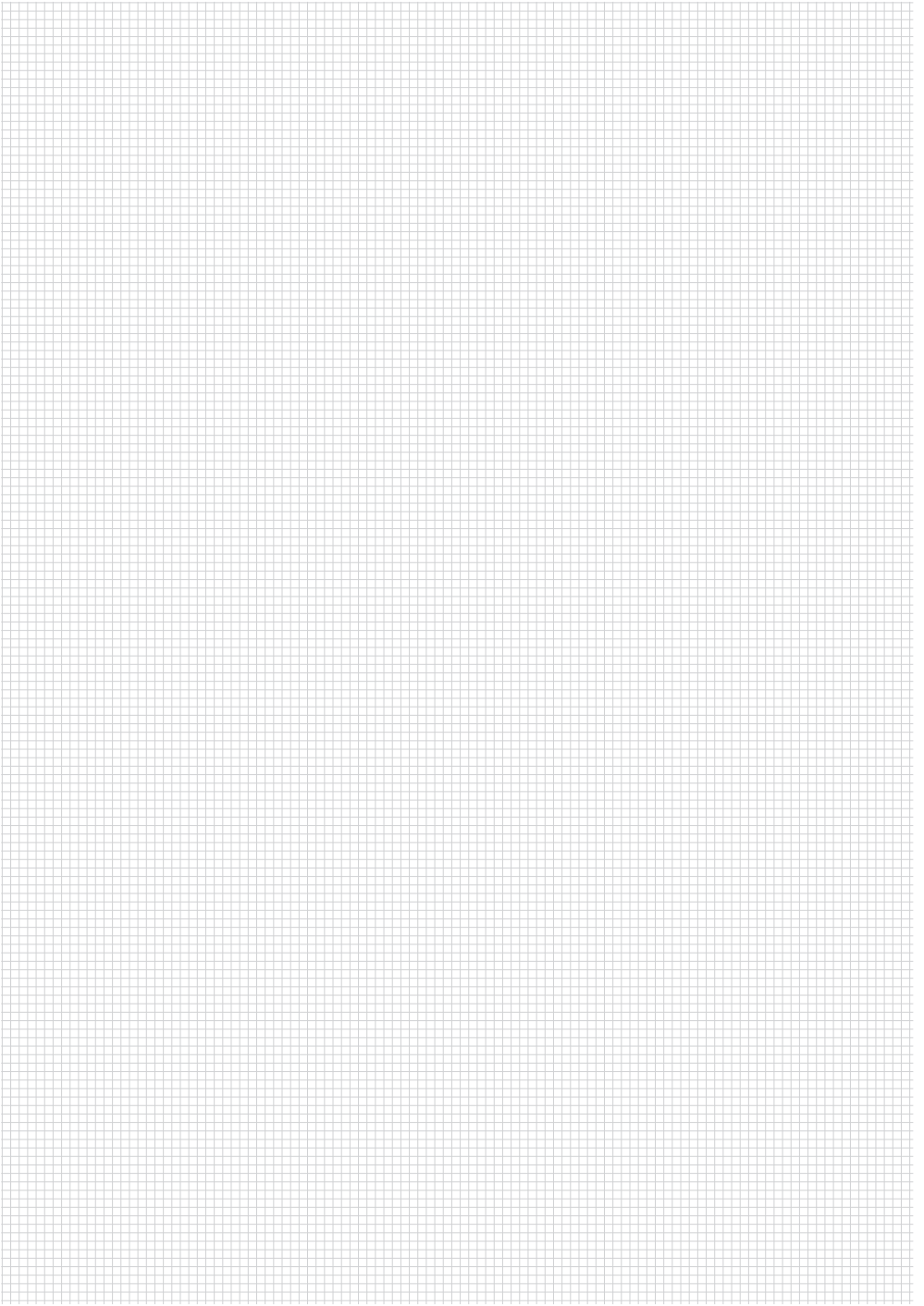
Undercuts on outer surfaces .....	31
Update	
applications.....	7, 13
firmware.....	85
USB driver installation.....	11
User interface	
FINOCAM .....	5
FINOCNC.....	71

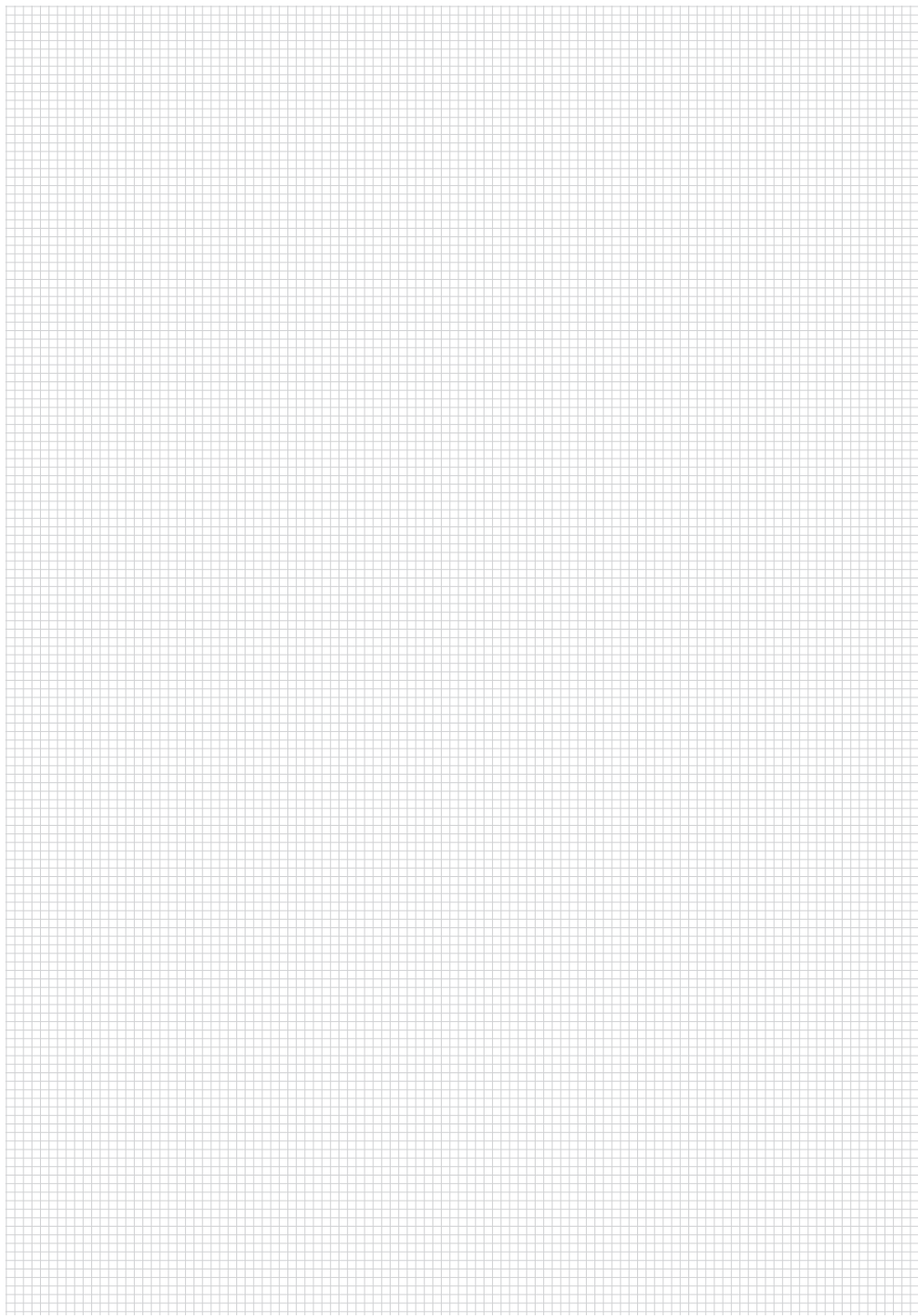
## V

Value bars .....	6
Vertical bar position.....	41
Virtual loading/unloading. <a href="#">See</a> Workpiece frame	

## W

Wet grinding module.....	19, 57, 88
unlock for CNC machine .....	57
Workpiece archive.....	25
Workpiece frame	
load into the working chamber .....	72
unload from the working chamber .....	72
virtual loading/unloading .....	72
Workpieces	
cards.....	23
colours .....	23
create.....	23
delete in FINOCAM .....	26
select .....	25





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